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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 143

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CONTENTS

WEST EUROPE

WEST AUSTRALIA ALP FOR URANIUM EXPORT MORATORIUM

Perth THE WEST AUSTRALIAN in English 22 Mar 82 p 14

[Text]

The State branch of the Australian Labor Party is solidly in favour of a moratorium on the export of uranium.

A special conference of the State ALP in the weekend voted unanimously in favour of the party's present national policy.

[This calls for a moratorium on uranium mining until after a full public debate on the issues and until adequate safeguards are found.]

The decision of the Australian Council of Trade Unions last December to lift bans on the export on uranium was viewed with concern by some WA unions.

Motions calling for the decision were put forward yesterday by three party branches, the Labor Women's Organisation and the Amalgamated Metal Workers and Shipwrights' Union.

The conference was held to alter its rules in line with the party's national structure decided on last year.

FAVOUR

Under the changes, the number of State delegates will reflect the number of House of Representatives seats in each State. This will favour the big States.

All States were previously represented equally at the national conference—the ALP's supreme policy-making forum.

The local conference also approved rules aimed at increasing the role of women in the party, by ensuring that 25 per cent of elected delegates are women.

A motion put by Senator Peter Walsh calls for changes to the Parliamentary Contributory Superannuation Act to "end Liberal Party abuses."

PREVENTING

The changes are aimed at preventing annual parliamentary pensions being commuted to a lump sum and suspending the pension while the former MP holds a full-time government position.

They would also seek to reduce the pension by 50 cents for every dollar of non-pension income of more than $5000 from any source until only half the pension is payable.

Motions from the State conference will be debated at the party's national conference in July.

CSO: 5100/7526

AAEC REPORT SHOWS DROP IN NATION'S URANIUM RESERVES

Brisbane THE COURIER-MAIL in English 22 Mar 82 p 23

[Text]

URANIUM was in the news last week when the Federal Government approved the Jabiluka uranium project in the Northern Territory.

Which made the "Australian Uranium Resources" section in the 29th annual report of the Australian Atomic Energy Commission even more interesting.

The report said Australia's reasonably assured resources at June 30 last totalled 294,000 tonnes of uranium.

This was a decrease in Australian reserves and, more, a decrease expressed as a percentage of the Western world's uranium.

The decrease of 5000 tonnes against the Australian total for the previous year was caused by the production of 2045 tonnes during the year, and to increasing costs, which lowers economic reserves.

Australia's low-cost reserves decreased from about 21 percent of the Western world's low-cost reasonably assured resources at June 30, 1976, to 16 percent in 1980 and 17 percent at June 30, 1981.

The decrease since 1976 reflects the rate at which uranium reserves have been proved in other countries.

The slight increase in 1981 was the result of a decrease in the Western world's reserves of 7 percent due to a substantial decrease in estimates for the United States.

Incidentally, there is a lot of nuclear-based electricity in the world these days.

Around the world there are 243 nuclear power units in operation, 229 under construction and 55 on order.

CSO: 5100/7526

CASTRO MADERO ELABORATES ON NUCLEAR DUMP SITE

Buenos Aires CLARIN in Spanish 17 Mar 82 p 5

[Interview with Carlos Castro Madero, chairman of the CNEA; date and place not specified]

[Text] The chairman of the CNEA [National Atomic Energy Commission], Vice Admiral Carlos Castro Madero, has said that by the end of this decade or at the beginning of the next, Argentina will have what he called a huge storage facility for the final products of the fuel cycle from our national nuclear plan.

After providing a great many details about the place where the facility will be located, in Chubut province, he said that the storage site--he rejected the term of "nuclear dump," calling it incorrect--will arouse "the envy" of countries which do not have such a facility, and said that it will become a factor in our political and economic development.

In an exclusive interview with CLARIN, he said that Argentine environmentalists are actively involved with the CNEA plan, and he rejected a proposal made by the physicist, Jorge Sabato, that a major national debate should take place on this issue.

He said that the project will require investments of "several hundred million dollars," but he added that "the costs of this storage must be included in the cost of generating electricity from nuclear power."

He was unwilling to express an opinion about the possibility that other countries might be allowed to send their wastes to Argentina for storage; he said any comment on his part might tend to arouse controversy.

"That is a political decision," he commented, and "there is no doubt that Chubut province and the nation could benefit by offering the use of this site for the storage of products brought

from other countries." Following is a summary of the conversation between Castro Madero and CLARIN.

Question: Some press reports have been speaking of a facility that, at least in Europe, is called a "nuclear dump."

Answer: News about the establishment of a nuclear dump has gotten out, and I must make it clear that the word "dump" is totally inappropriate and misleading. When we hear the word "dump" it suggests that trash is being thrown in a disorderly and uncontrolled manner into a place in contact with the environment, where people who might have some interest in what they could find there could obtain easy access. But the Gastre storage site is very far from being a dump, because it is a highly sophisticated facility.

Question: Has this type of storage facility aroused any sort of conflict?

Answer: There is a great deal of conflict about this issue all over the world. It is paralyzing the development of nuclear energy. The conflict centers on the places where the final products of the fuel cycle should be stored. In this instance, Argentina is taking a big step forward, so that we can be prepared to store these products. To do this, we have conducted studies of the geologically acceptable locations in the country. These studies began over a year ago, after a contract was signed with the University of San Juan.

Question: What are the characteristics of a nuclear storage facility?

Answer: These storage facilities must have two characteristics:

1. They must have great seismic stability;

2. There must be no access for water, which may be an agent of corrosion and conduction.

From the 200 possible places, one was selected, which is located about 50 kilometers away from Gastre in Chubut province. It is a granite formation which has been stable for millions of years, with no access for water. At the appropriate depths of 500 to 700 meters, galleries will be created, where the final products of the fuel cycle will be stored. These products are already being packaged in an appropriate manner. They will be controlled and arranged in these galleries so that they will not affect either the environment or any people who might come into the area.

Question: Does any country in the world now have a storage site?

Answer: No. The Germans have chosen a salt mine, which also meets the requirements of being an area that is geologically very stable, and with no water access. But the German facility is still in the planning phase.

The government of Argentina wants to avoid giving public opinion or groups of environmentalists any cause to question the use of nuclear energy.

These studies in Gastre were begun during the last 2 years, and the investment is between 40 and 50 billion Argentine pesos.

Question: Is there any urgency about building this storage facility?

Answer: No. Argentina still has no reprocessing plant in operation; such a plant extracts plutonium and uranium, separating them from the final products which must be kept in storage. Argentina is making its plans well in advance, so that when the time comes when we need to reprocess in order to obtain this plutonium so it can be used in fuel elements, we will then have a suitable place in which to store highly radioactive elements.

Question: When will the storage site be operating?

Answer: We think that it may be needed by the end of this decade or at the beginning of the 1990s.

Question: Has the project aroused any reaction from Argentine environmentalists?

Answer: No, not at all. Environmentalists are involved in the ecological studies done for nuclear facilities. In this case, geologists from the University of San Juan are taking part in the project.

Question: I understand that the problem of safety is not limited just to the environment?

Answer: All aspects will be considered. These radioactive materials coming from reprocessing plants have suitable containers which cancel out any possible radiation they may have. After being packaged in these containers, they are taken to the final storage site. In this instance, we have no reprocessing plant. For that reason, the problem of high levels of

radioactivity will not exist until the storage facility is built. What is being transported now is done in suitable containers, and the products involved have low levels of radioactivity.

Question: Will the Chubut facility accept nuclear wastes from other countries?

Answer: The storage facility is being built solely for Argentina and its nuclear plan. Nonetheless, the range of possibilities is very broad, and this will depend on a political decision to be made at the appropriate time. Many storage sites are now needed all over the world. This site is for Argentina's nuclear plan. We expect our reprocessing plant to produce highly radioactive elements. The storage site has no connection with any other nuclear program of any other country.

Question: Have the amount of the investments and the source of the funding been determined?

Answer: The project will have to be financed by generating electricity. The cost of storage must be included in the cost of generating electricity from nuclear power. Several hundred million dollars are involved, which will come from megawatts of electricity to be generated. This must cover the cost of the fuel, of uranium exploration and mining, and of the final storage.

Question: But is it possible that some other countries may send their wastes here?

Answer: This plant is going to arouse the envy of countries which don't have one. It will be a factor contributing to our political and economic development. With this storage facility, we will move to the head of countries with nuclear development programs. Saying that we should or should not accept elements from other countries would only stir up controversy.

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CSO: 5100/2132

CNEA CHAIRMAN ON EFFECTS OF NUCLEAR BUDGET CUTS

Buenos Aires CONVICCION in Spanish 17 Mar 82 p 11

[Interview with Castro Madero, chairman of the CNEA, 16 Mar 1982; place not specified]

[Text] Yesterday, in an exclusive interview with CONVICCION, the director of the CNEA [National Atomic Energy Commission], Vice Admiral Carlos Castro Madero, said that budget cuts have already caused a 1-year delay in Atucha II, and that now they are trying to avoid any delay in the Embalse plant and in the heavy water plant, which is one of the pillars of the Argentine Nuclear Plan.

Castro Madero, who also pointed out that no final decisions have yet been reached, and that talks are still in progress with the planning department in order to reconcile opposing views, spoke of nuclear detonations for peaceful purposes, relations with the United States and the Club of London, and the project to build a nuclear storage facility.

The conversation is given below:

Question: Vice Admiral, what is a nuclear dump?

Answer: In the first place, I would like to make it clear to you that the term "dump" is totally inappropriate, because it conveys the idea of a place where trash is dumped indiscriminately, in a disorderly way, and left in contact with the environment, without taking any precautions so that human beings will not come into contact with it. What we are planning is to develop a storage facility for the final products of the fuel cycle. The most advanced nations in the western world have the problem of where to store the final wastes of this cycle, and in some cases, public opinion has blocked the operation of nuclear plants that have already been completed. Argentina is now moving ahead in this field, because it is already doing

studies for the timely construction of a storage facility. This storage facility, I repeat, is for the final products of the fuel cycle. This means that it is planned to preserve definitively the environment and human beings from any possible harmful effects of fuel cycle products.

Question: At this time, the environmental movement is almost a political activity in some parts of the world. It is possible that news of this development may stir up some criticism or concern in Argentina about contamination or some such problem related to the storage facility. Is there any danger? What controls are used?

Answer: I am actually very concerned about the fact that a political movement might begin to develop in Argentina, hiding behind the environmental movement. The storage facility is a granite geological formation, which must also have a suitable resistance to radiation. Galleries are drilled in this granite formation, down to depths of 500 or 800 meters. There, in a very controlled and orderly fashion, properly packaged products from the fuel cycle are placed, so that there will be no impact at all on the environment. We have chosen an area that meets these requirements; we are going to drill in order to verify that the geological formation does truly meet all the requisites, and this will spur development in a practically deserted area, located about 40 or 50 kilometers from the town of Gastre in Chubut province in the Sierra Mediana mountains. This will also help the development of Patagonia.

Question: At this time, when there are very tight budget restrictions, how could this project be fit into the nuclear plan? Wouldn't it generate new delays, new cutbacks, and further stretch already limited resources? How can this be reconciled with the policy of restrictions being advocated by the finance ministry?

Answer: The cost should not be very high, but obviously, if it is to get started, it must be included in the budget. Fortunately, Argentina is under no pressure to develop this storage site. The project is included in the budget that has been prepared, because we feel that it is not a very large investment, about 40 billion over a 2-year period, but it will obviously depend on the final decision of the executive. In this case, Argentina is moving ahead in order to avoid any problems like the ones we mentioned in relation to the environmental movement. But there can be no doubt that its start could be delayed if the funds are not provided.

Question: The ministry of finance does intend not to grant to the CNEA the 8 billion pesos requested for the current fiscal year. What projects would be affected by a budget cut for this year?

Answer: We are trying to optimize to the utmost the resources that the PEN [National Executive Body] allocates to us. We already know that Atucha II is going to be a year behind schedule. I hope that the cuts will not affect Embalse or the heavy water plant, but we are still talking with the planning ministry. The planning ministry is still in the process of preparing the budget that will be sent to the executive.

Question: That means that nothing has yet been decided.

Answer: No. Nothing has been settled.

Question: You recently took part in a meeting in Japan, at which all the other participants belonged to the Club of London. Is that fact of political significance, in terms of Argentina's nuclear development moving us ahead in the world, or is it a technical distinction?

Answer: It is a distinction conferred on Argentina, by inviting us to participate along with advanced countries such as France, England, Russia, the United States, and Japan. There the nuclear strategy of each participant was discussed. Argentina's advanced position in nuclear development was recognized, and this enabled us to establish contacts with Japanese officials who are interested in Argentina's nuclear plan.

Question: While you were in Japan, some White House spokesmen said they made no distinction between nuclear detonations for peaceful purposes and nuclear detonations "of other types." This comment was made in reference to your remarks that Argentina would not renounce the use of nuclear detonations for peaceful purposes when necessary. Do you have any response to that?

Answer: The position of the United States is well known. When they ratified the Treaty of Tlatelolco, they said then that there were no distinctions between detonations for peaceful purposes and those for military purposes. But Argentina is totally unwilling to give up the possibility of using nuclear detonations for peaceful purposes.

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CSO: 5100/2132

CESAR CALS ANSWERS QUESTIONS ON NUCLEAR PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 13 Apr 82 p 36

[Interview with Minister of Mines and Energy Cesar Cals by Carlos Chagas, Milano Lopes, Estelina Farias and Jose Roberto Arruda of O ESTADO DE SAO PAULO; date, time and place not given]

[Text] Minister Cesar Cals, in an exclusive interview with O ESTADO, confirmed that there are reasonable doubts on the jet nozzle project by means of which Brazil seeks to obtain the sensitive technology for enriching uranium and which served as the bases and justification for the German-Brazilian Nuclear Agreement. The minister of mines and energy increased the area of uncertainty on this process even more by saying that it could be ready between 1987 and 1990. In the meantime, we shall continue to import uranium enrichment services.

He also confirmed the charges made by ESTADO and JORNAL DA TARDE in their editions of 28 March and 1 April that the Germans sold Brazil the technology to another process, that of the ultracentrifuge in the preliminary negotiations of the nuclear agreement, later withdrawing the offer under the allegations that URENCO did not allow the transfer of that technology.

Minister Cesar Cals pointed out that the jet nozzle process produces enriched uranium but it is not known at what price. Moreover, energy efficiency comparable to other processes such as the ultracentrifuge or gaseous diffusion is not obtained. He believes, however, the time will come when it must be used, even if it is the most expensive, so as to achieve self-sufficiency. He also confirmed that Brazil is seeking other countries who want to transfer nuclear technology and in addition wants to develop its own research here.

Question: Is it rational to spend $30 billion on a nuclear program based on a presumption? What if it does not work?

Cesar Cals: Look carefully at what you are saying. The nuclear program is not $30 billion, that is, I have eight nuclear powerplants. You have to subtract $24 billion or $16 billion at $2,000 per kilowatt of powerplants, either nuclear or hydroelectric, from that $30 billion. Do not confuse the nuclear technology program with the fuel cycle. Even in the fuel cycle program itself you should only count the jet centrifuge, which should cost from $1 to $2 billion. The remainder is for uranium concentrate which one needs and it is included in the $30 billion. Hexafluroide is needed, so is the fuel element plant and so is NUCLEP [NUCLEBRAS [Brazilian Nuclear Corporations] Heavy Equipment, Inc]. In short, it is not $30 billion; you have to subtract the powerplants and everything that does not depend on the enrichment process.

Dario Gomes: [Dario Gomes is an adviser to Minister Cesar Cals] The question of uranium enrichment is not a hypothesis, it exists in practice.

Question: Has the jet nozzle process already enriched some uranium?

Dario Gomes: It has.

Question: At the laboratory level?

Dario Gomes: Uranium enrichment was tested at that same plant at Belo Horizonte. Professor Becker is now improving the conditions of his process, practically doubling the yield by means of double deflection, which you should also know. That process has been using the same amount of energy and instead of making one separation it makes two, doubling the yield of the system.

Question: Is there still a doubt that the process can produce on an industrial scale?

Cesar Cals: If there were, no one would make an agreement with Brazil but would sell enriched uranium. The question is why sell that technology? Why was the nuclear agreement made? Because for reasons of political questions of the postwar period, Germany was forbidden to install a uranium enrichment plant in its territory. There are certain things which cannot be forgotten. First of all, that is not a process that is readily available; it is a political weapon, particularly political because it can be used for nonpeaceful means. Therefore, they are afraid of disseminating the enrichment process.

Question: What is it the Germans want politically?

Cesar Cals: I believe they want a supply of enriched uranium in a country which has uranium. They also want an important market for other things.

Question: Would the bomb be involved in that?

Cesar Cals: No! They want an important market in other things. When thousands of Brazilians are sent over there for training, you can make--that is my point of view--an important market for other industrial products.

Question: It has been learned that when the Germans negotiated the nuclear agreement they signed a letter of intent, which came to be the basis for the Protocol of Brasilia, and they sold us the technology of the centrifuge. In a subsidiary clause, Brazil pledged to invest $50 million in the development of a process, unknown at the time, called the "jet nozzle." Three months after that preliminary meeting, when the nuclear program had acquired a form and the chain of interests had been created, the Germans return and inform us that they can no longer transfer the ultracentrifuge technology because URENCO refused it. Then, when they sold it to us, did they not know they could not transfer the ultra-centrifuge technology?

Cesar Cals: That is the second item, a willingness to transfer.

Question: Do you confirm that story?

Cesar Cals: I read that agreement but I confess I cannot quote all the clauses by heart.

Dario Gomes: I have the impression that it is more or less the story.

Cesar Cals: I find it reasonable to say that the question is that of wanting to transfer.

Question: The changes in the original concept of the jet nozzle project worry nuclear physicists. They say that the delay in the system will be greater, that the details of the project will have to be redone and that orders for compressors, autoclaves, photocurrent plates will also be delayed.

Dario Gomes: The concept of the project did not change. It shall be the same. The gas to be used will be hydrogen in the first cascade and deflexion will be simple, precisely so as to stick to the timetable. From the second cascade on, the system with double deflection and helium gas will be used.

Question: Is that still on the drawing boards?

Dario Gomes: No. Also that pilot plant at Minas Gerais is testing everything; it has that capability. It is a plant where modifications are made and each improvement is introduced and tested before proceeding with a demonstration. When it goes for a demonstration, it is final.

Question: Is the improvement of the process studied in Germany and tested in Belo Horizonte?

Dario Gomes: It is tested by our personnel, who are still over there, and brought here, tested at Belo Horizonte, approved and then introduced into the demonstration plant. You can see it is the logical sequence of an undertaking.

Question: Is the important thing knowing whether that technological advance resulted in an effective saving by comparison with the ultracentrifuge and gaseous diffusion processes?

Cesar Cals: That is what we hope. But even if it is not successful, we did not have the other processes available, even if it was not the one which used the most energy. That is why I put things this way: Is there a willingness to transfer?

Question: You could add a fifth item to the sequence: Does the time come when it is necessary to use a technology even if it is more expensive than the others?

Cesar Cals: Obviously, if you want to be independent you have to have those energy sources. For example, do you believe the liquified coal of South Africa is economical? It is not. Why are they using it? Because that is the solution.

Question: Until such a time as Brazil is in a position to enrich its uranium does it have the guarantee that URENCO is going to supply enriched uranium?

Cesar Cals: It will for Angra I.

Question: What about the rest?

Cesar Cals: We expect that by 1987 we shall have the first phase of the demonstration plant in operation for the rest.

Question: Does that mean that the initial load for Angra II will be nationally produced?

Cesar Cals: We expect it to be ours.

Question: Some people say that the process of transfer of technology is being sold to us as if it were a "Hydra-headed monster." The uranium enrichment principle is supposedly simple. The greatest difficulty would be in welding, the special solders for the large industrial units, of very special metal alloys. That technology is not being absorbed by our industry because the process is not being spread to the Brazilian industrial park. Therefore, will technology remain on paper?

Cesar Cals: It is not necessary to produce everything, the necessary thing is to be able to do it. We are going to purchase zircalloy from Argentina. Moreover, it is easier to have another country make the solder than to remain without the enrichment process, obtaining only enriched uranium. The Germans themselves buy that solder in Japan.

Dario Gomes: The casting part in the majority of countries is done in Japan. Today, generally, there is not only the nuclear industry, there are countries which specialize in certain components, with a constant exchange of industrial items.

Question: You said there was an alternative for enriching uranium, that we are doing our own research, in that respect, what was done with the project of Professor Sergio Porto?

Cesar Cals: The National Nuclear Energy Commission continues to do all research. Work is continuing in all areas.

Question: Does that mean we are developing our own uranium enrichment process?

Cesar Cals: We are working. We are not forced to remain with only one process. If tomorrow we wanted to, or could, buy a new process, there is nothing that calls for one exclusively.

Question: Are you confident that the new process would be good enough for the installation of an enrichment plant at Itataia?

Cesar Cals: I have not decided that it should be in Itataia. My decision is conceptual. I believe that Brazil should prepare for being an exporter of enriched uranium. Between 1990, or a little after that, and the year 2040, the industrialized world will obtain its electric power from nuclear fission sources. At that time, according to what I have been told, the enriched uranium market will be a seller's market. Therefore, since Brazil has a large reserve already found, it is enough for creating a plan for the export of enriched uranium economically. Why enriched uranium? Because the prices for it show that not only is it more economical, it is more profitable: It is selling for $1,560 a kilo. I believe we should have it, not only because it is more economical, but because it is power. Just as the other countries condition the supply of enriched uranium to some others, we shall at that time have more power than the petroleum producing countries have now.

Question: It is frequently asked: "When will there be openness in the nuclear program?

Cesar Cals: There is total openness, never has so much been said. The Ministry has no secrets.

Question: Why does NUCLEBRAS not publish its accountings in the newspapers as is required by the Law on Corporations? No one knows up to now how much was spent on the nuclear program.

Cesar Cals: If you want any information I will give it to you.

Question: Six months after you took over the Ministry, you issued a decree classifying several items in the nuclear program as "secret, confidencial and restricted." Could that be the reason for the lack of information?

Cesar Cals: On the contrary, I am completely open.

Question: Senator Virgilio Tavora, when he read the nuclear agreement in the Congress, after he concluded the justifications for it, said: "I am not going to read the shareholder agreements or the annexes to the agreement because they are tiresome reading, however all those documents will remain at the disposal of the National Congress." Nothing more was ever heard of them...

Cesar Cals: I sent everything to the CPI [Congressional Investigating Committee].

Question: But everything classified "secret?"

Cesar Cals: It was no secret. You must understand that commercial agreements should not be made known to other countries for all the world to know. Not even the technological agreement of Voith of Germany with the Voith here is known. After all, they are commercial agreements. When we sent them to Congress, we sent them to secret sessions, so that the nation would learn of them through their representatives. Now the newspapers cannot be called and informed because on the following day all the ambassadors of all the countries would have access to them.

Question: However, all those agreements are published in Germany. All you have to do is go to the Chamber of Commerce of a German city where there are companies which belong to the program and ask for a copy. Is secrecy only extant in Brazil? Did you not know that NUCLEBRAS does not publish its accountings?

Cesar Cals: I knew it.

Question: Is it not required to do so by the Corporation Law?

Cesar Cals: It has a special law.

Question: Which does not require publications of accounting?

Cesar Cals: Right.

Question: Why, Minister?

Cesar Cals: I did not make the law, it was a legislator.

Question: Do you believe it is a case of national security?

Cesar Cals: I believe the nuclear policy in Brazil is part of the Ministry of Mines and Energy, the National Security Council and the Ministry of Foreign Affairs. Nuclear Policy is the policy of the three.

Question: Would you accept negotiations of another nuclear program with another country, for example, France?

Cesar Cals: We already entered into one with Italy for fast reactors, the "breeders."

Question: And the sensitive technology, would you accept another negotiation?

Cesar Cals: I would accept it. I believe Brazil, if there is a country which wants to transfer technology, has no difficulties. It only depends on knowing whether it would be economical to do that.

Question: Are we looking abroad for someone to offer us nuclear technology?

Cesar Cals: We have personnel outside the country who are permanently exchanging information, including in the International Atomic Energy Agency in Vienna.

Question: Uranium enrichment is a basic part of the technology transfer process of the Brazilian nuclear program. It is knowing that we are facing many problems in that area, with successive postponements in the jet nozzle process.

Cesar Cals: I must say that initially the pilot plant, which was disassembled by Brazilian technicians, who were working with it in Germany, is being assembled in Belo Horizonte and has already begun operations. Actually what is being said is that it is a process which uses large amounts of energy. It does enrich uranium but with a large use of energy. There is an expectation that the technological development of that process will lead to a reduction in the use of energy to levels which are compatible with that of other processes.

Question: What about changes in the original concept of the project?

Cesar Cals: I do not want to get into the analysis of that project because, after all, I am not a technician.

Question: Physicists say the machine in Belo Horizonte produces no enriched uranium at all.

Cesar Cals: It is a pilot machine for laboratory tests only. The first demonstration plant is being built in Resende. There seems to be no doubt about the jet nozzle process. There may be doubts on the energy efficiency of the process.

Question: After seven years that energy efficiency should have taken some steps. Initially it was 10,500 kw/hour per SWU, which means practically five times more than the gaseous diffusion process and more than 20 times that of the ultra-centrifuge. Compared to the other two processes, the jet nozzle was extremely unfavorable.

Cesar Cals: I look at things in another light. You favor the learning of a technology or the development of our own technology or for the absorption of imported technology. To transfer a technology four items are required: First, someone who has it; second, someone who wants to transfer it; third, someone who is able to receive it, and fourth, someone who can pay for it. Now there are other processes for enrichment if there is a desire to comply with the second item, that is, someone who wants to transfer it.

Now the only one who wanted to transfer it was Germany, which has that technology. The second item was eliminated: That of wanting to transfer. We must place people capable of learning. However, we already had people who were capable, who went over there, were trained, operated the enrichment plant, disassembled it, supervised the disassembly and are, therefore, capable of learning. Finally, Brazil can pay for it.

Question: The problem we are addressing is that neither we nor the Germans can answer the following question yet: When will the jet nozzle process be in operation commercially?

Cesar Cals: We say that we expect it to be between 1987 and 1990. We cannot say yes or no, we simply wait. The presumption in any process of technological development is that it normally has no timetables. When you say that nuclear fusion will be in operation in the year 2040, it could be in operation in the year 2035 or in 2045. It is a presumption.

Question: From what can be seen, we are in a more solid position than the Germans because in November of last year I was visiting that research work over there and I asked the technicians when the jet nozzle would go into operation and they said they did not know yet.

Cesar Cals: However, our technicians believe that between 1987 and 1990 we shall have knowledge of the enrichment process.

Question: Does that mean that the jet nozzle process can actually be transferred to Brazil as of 1990?

Cesar Cals: That means that we can be operating with an economical yield in Brazil in 1987, which is the timetable, but I am using 1990 as a natural limit.

Question: How about the uranium enrichment plant you are seeking to install at Itataia in Ceara? Will it have the jet nozzle technology?

Cesar Cals: We are going to see whether it will be that process or another. It could be another. Our personnel continues to make other research.

Question: Could it be a turn key plant such as the one France offered Brazil?

Cesar Cals: France, like the United States, does not want to transfer technology. We do not want any turn key deal.

Question: In no way?

Cesar Cals: We only want uranium hexafluoride at this time because the enrichment technical development may not have a timetable for operating commercially, but we do need hexafluoride. What we want is to learn the technology. We are convinced, and it is another phrase I have already said and am going to repeat: Whoever has energy has power and whoever knows the technology of its energy sources has an instrument of common usage. I will say with all sincerity: There was a case, and you know which one, in which Brazil contracted for a reloading of uranium for Angra I. After the contract was signed, at the time for the delivery of the uranium, other conditions were required. Therefore, the country that does not know the technology of its energy sources will always be subject to the political decisions of the other countries which have it. It is a Brazilian decision to learn the technology of nuclear energy.

Question: Taking into consideration that everything will work, that the jet nozzle process is approved and goes into operation at the demonstration plant at Resende, the annual production of that plant would be 64 tons per year, which would not even be enough for supplying the reactor of Angra 2 which requires 100 tons, would we exchange the present dependence on petroleum for that of uranium?

Dario Gomes: (adviser for nuclear affairs to the Ministry of Mines and Energy) The Resende plant is being built in modules and the modules are going into operation, at a yearly rate which is unknown to me.

Cesar Cals: It is like the Itaipu Plant, you have one machine today, another four months from now, and so forth.

Question: When do you believe, then, that we shall eliminate the need to purchase uranium enrichment service abroad?

Cesar Cals: Around 1990.

Dario Gomes: I have the impression that it will be exactly then. With today's program of nine units, we shall practically be producing all the loads here in 1990.

8908
CSO: 5100/2148

GERMAN OFFICIAL SAYS JET NOZZLE PROCESS ALREADY VIABLE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 7 Apr 82 p 29

[Article by Assis Mendonca: "Brazil Preferred the Jet Nozzle, Declares German"]

[Text] Bonn--The decision to adopt modifications in the uranium enrichment system was made principally by the Brazilian side on the basis of an evaluation of the advantages and disadvantages of the use of hydrogen and helium, declared Wolf Schmidt-Kuester, official of the German Ministry for Research and Technology, in Bonn yesterday. According to him, the jet nozzle process is completely developed and present research being done pursuant to the nuclear cooperation agreement is aimed exclusively at an even better technological advance, primarily in that which has to do with productivity and production costs. At the present stage of development, the German uranium enrichment process operates at a cost which is higher than the cost of the gas centrifuge system and practically the same as the gaseous diffusion system, a method suitable only for large-scale production, however.

According to Schmidt-Kuester, the jet nozzle system was developed with the use of helium, passing on later to the use of hydrogen with the aim of reducing production costs. This, however, would have meant greater expenditures in construction work since it is necessary to adopt expensive measures for preventing explosions. For this reason, German and Brazilian technicians elected to return to the use of helium, the Brazilian side having made the final decision. This does not imply, in the understanding of the official of the Ministry for Research and Technology, any lag in the uranium enrichment process and should raise no doubts as to its operation. We do not have the slightest doubt that the powerplants will strictly accomplish the task for which they were built," he declared.

As to the possibility of Brazil obtaining URENCO gas centrifuge technology, Wolf Schmidt-Kuester said that such a possibility never existed, nor does it exist now. URENCO is a firm belonging to the German, Dutch and British Governments and the Germans cannot individually avail themselves of the technology developed by it. At this time there is no indication the Dutch and British Governments are going to change their position of restrictions on providing Brazil with that technology. However, URENCO has assumed the responsibility for providing enriched uranium to NUCLEBRAS [Brazilian Nuclear Corporations] for keeping Brazilian reactors in operation as long as there is no national production of nuclear fuel.

As far as Wolf Schmidt-Kuester is concerned, the Brazilian decision to undertake a work of cooperation in improving the German jet nozzle process was correct because it guarantees the country, not only the construction of uranium enrichment plants and the possibility of a future increase in production, but also the learning of the complete nuclear fuel cycle, making Brazil independent of foreign supplies in that area.

8908
CSO: 5100/2148

GERMAN OFFICIAL DENIES OFFERING URENCO TECHNOLOGY

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 15 Apr 82 p 31

[Article by Assis Mendonca: "Germany Denies Having Negotiated Another Process"]

[Text] Bonn--Germany never promised or negotiated URENCO uranium enrichment technology, the ultracentrifuge, with Brazil, declared Emil Gruber, official in charge of bilateral relations in the German Ministry for Research and Technology, yesterday. He participated in all negotiations of the nuclear agreement, including the preliminary. He said the Germans did not offer the ultracentrifuge to Brazil at any time "for a number of reasons."

The German Government official explained that the Brazilian side showed an interest in the URENCO process but was informed that Germany could not avail itself of it by itself and soundings made with the three-nation company revealed that Great Britain, and particularly Holland, were not willing to give the ultracentrifuge to Brazil.

Moreover, argued Gruber, the development of the URENCO process was in its final phase of development, which made it difficult to include Brazilian technicians. "Brazil would always be running behind the others," he added, "since it would not be acceptable to have to begin at zero again just so the Brazilians could follow the research."

Co-owner

The Ministry of Research and Technology official says there was agreement on the decision to develop the jet nozzle process jointly with Germany. That technology was very new when the two countries signed the cooperation agreement and this allows Brazil to participate completely in its development, also becoming co-owner of the process with all the rights to avail itself of it. "That is the way," said Gruber, "that the transfer of technology is accomplished."

If perhaps it would have been possible at the time to negotiate an ultracentrifuge, Brazil would have received a technological "Black Box" in whose development it did not participate and on which it would not have a complete knowledge for that reason, according to Gruber. The jet nozzle, on the other hand, is a German-Brazilian technology on which Brazilian and German technicians are working and on which Brazil will have all the rights of a co-owner.

Gruber does not believe there will be a delay in the Brazilian nuclear timetable because of the adoption of a technology for enriching uranium which is still being developed. "Even if the URENCO technology had been transferred to Brazil, there would not yet be any commercial powerplant in the country, because there is no interest in creating a supercapability in production," he declared.

Becker

Professor Erwin Becker, inventor of the jet nozzle process, is also of the opinion that joint development of this technology will allow Brazilian technicians to have a better understanding of the process than would the purchase of a ready-made system such as the ultracentrifuge. According to Becker, there is the additional benefit of the acquisition of co-ownership rights because of the joint research "in which Germany has also spent much money," aimed at the construction of a uranium enrichment plant.

"We are convinced the decision was correct," said Becker, "Brazil will not just have any technology, which may perhaps work some day, but rather an excellent technology." Its use in commercial powerplants, according to the professor, may possibly be delayed because of the needs of the uranium market, which are not as great as was previously estimated. The commercial use of the process, however, is guaranteed.

The pilot plant at Resende, in turn, will guarantee supplies for one reactor as of 1986 and for three reactors as of 1988, said Erwin Becker. In this manner Brazil would be assured of independence from enriched uranium supplies from abroad within the time periods stipulated from the beginning.

No Comment

Unlike Emil Gruber, official of the German Ministry for Research and Technology, and Professor Erwin Becker of the Nuclear Research Center of Karlsruhe, who replied in indirect manner to statements by Minister Cesar Cals to ESTADO, a Ministry of Foreign Affairs spokesman yesterday refused to make any comment on the subject, alleging that he did not know the text of the interview with the minister of mines and energy.

The Ministry of Foreign Affairs spokesman restricted himself to stating that Germany has complied, and will comply, with the commitments assumed through the signing of the bilateral technical cooperation agreement. In the specific case of the transfer of nuclear technology, he explained the agreement stipulates the construction of uranium enrichment and reprocessing pilot plants and that the timetable agreed upon between the two parties is being met.

3908
CSO: 5100/2148

NONRADIOACTIVE STEAM LEAK CONFIRMED AT ANGRA I

Sao Paulo FOLHA DE SAO PAULO in Portuguese 2 Apr 82 p 21

[Text] Rio--The director of the National Nuclear Energy Commission [CNEN], Rex Nazareth Alves, yesterday confirmed the leaking of nonradioactive steam at the Angra I nuclear powerplant due to the operating failure of a valve. It was necessary to shut down the powerplant from 1400 to 2030 on Tuesday as a precautionary measure while the defect was being repaired.

Angra I returned to normal operation and has already reached 5 percent of its power, although it is not yet generating power because the steam produced is being blocked by a valve which prevents its passing on to the turbines. The increase in power to 10 percent, when the powerplant will begin to generate power and be sinchronized with the distribution system, was scheduled for day before yesterday, but up until 1800 yesterday the power had not been raised.

Nazareth Alves stated that tests are made to confirm the operation of equipment, it therefore being normal to make these readjustments. However, the Furnas Electric Powerplants press office denied the leak day before yesterday, although technicians at the powerplant confirmed the incident.

The CNEN director also guaranteed that the tests were being made with the maximum of care and without haste. The defect noted could be repaired with Angra I in operation, even if the power being produced were higher, but it was shut down as a safety measure.

Rex Nazareth Alves revealed that the powerplant will be shut down for a period of 40 to 50 days when it reaches 30 percent of its power so that all measurements and checks of equipment may be made. Subsequently it will begin to operate again at 30 percent of its power until it is safe to increase its capacity.

The steam leak was noticed at 1400 Tuesday by a circulating operator, the plant being immediately shut down. One of the valves, of a total of 150 similar valves, showed a failure at a joint, said Nazareth Alves, but there was no leakage of radioactivity because the equipment is located in the pipes between the steam generator and the turbine. This type of defect does not compromise the safety of Angra I because the water circulating in this place is not radioactive.

8908
CSO: 5100/2148

NEED FOR 13 NUCLEAR POWER PLANTS SEEN FOR 2020

Brussels LE SOIR in French 2 Apr 82 p 8

[Article by G. Dt.: "Will 13 Nuclear Power Plants (1.3 Megawatts) Be Needed in Belgium Before 2020?"]

[Text] On the eve of the parliamentary debate on energy, an "explosive" document has been published. CORE, an econometric research center at the Catholic University of Louvain, has issued a long paper on the energy future of Belgium and the impact of energy savings and new technologies. Its conclusion: Before 2020 it will be necessary to build 13 new nuclear power plants of 1.3 megawatts each in Belgium. Moreover, the center's mathematical model does allow for the impact of an energy plan for energy savings and expansion of urban heating.

Admittedly, it is only a somewhat academic study whose hypotheses can easily be disputed, but it is obvious that the issuance of such a document "sponsored" by the European communities and enjoying the support of the scientific policy services will be exploited by the "pro-nuclear" people. We would guess that in the government itself, Messrs Knoops and Maystadt will interpret this study differently.

In order to make a "good model" you need good hypotheses, and it is clearly at this level that the study is weakest. It foresees, for example, an increase in primary energy demand of 2.39 percent per year between 1985 and 1990, which appears high. This increase would diminish thereafter, and consumption would only increase by .2 percent a year after 2000, when the economy measures would achieve full effect.

In the next 40 years we will see a very significant trend from petroleum and gas to coal and especially toward nuclear energy. Petroleum's share in our energy supply will decrease from 50 percent in 1980 to 32 percent in 2020. The share of gas will decline from 21 percent to 7 percent, coal will stay the same, and the share of nuclear energy will shoot up from 5 percent today to 39 percent of our energy supply in 2020.

We will then truly have entered an "all-electric" era, with more than 25 percent of home heating being electric. All these extrapolations result from optimum economic calculations. The study also estimates the cost of a prolonged nuclear moratorium. If we do not construct any more nuclear power

plants in Belgium from now until 2020, that will cost us 200 billion 1980 francs for the whole period, because we will have to use more expensive energy.

These predictions imply that, in addition to the 7 nuclear power plants now existing or under construction, we should build 13 new plants of 1.3 megawatts each. It is here, obviously, that the shoe pinches. The study totally neglects certain policy considerations: What sites could still be found? Would it not be dangerous to put all our eggs in one basket? What would happen in case of a serious accident in a nuclear power plant? Wouldn't we have to shut down all production for a period, like we grounded all DC-10's for several weeks when a consistent manufacturing defect was detected? Moreover, what about the enormous draw on the capital market which such investments would entail? The CORE study also analyzes the impact of energy economies and new sources of energy.

The study ranks these methods in order of effectiveness. Energy economy emerges as by far the most productive, particularly insulation of buildings and measures in the concrete and glass industries. Much further behind would come conversion of industries to coal, underground gasification, production of hydrogen nuclear-electric power, urban heating, and the heat pump. Only at the tail end of the ranking do we find the soft energy sources (sun and wind).

9920
CSO: 5100/2140

CURRENT, FUTURE NUCLEAR POWER PLANTS LISTED

Duesseldorf ATOMWIRTSCHAFT/ATOMTECHNIK in German Apr 82 pp 215-231

/Unattributed Article/

Part I of the Report on Building Construction and Building Projects in Europe

/Text/ The special report, which the ATW (Atomic Business) publishes annually concerning "New Nuclear Power Plants" contains tabular surveys and individual status reports concerning all nuclear power plants that are under construction or that are being planned, according to the most recent status. Furthermore, a summary report is given concerning installations already in operation. Although a new power plant (KKG) was put in operation at the end of 1981, stagnation prevailed in the expansion of nuclear energy, since no new orders and no new construction approvals were issued. With most of the blocks under construction, there was a further delay of the expected date of start-up.

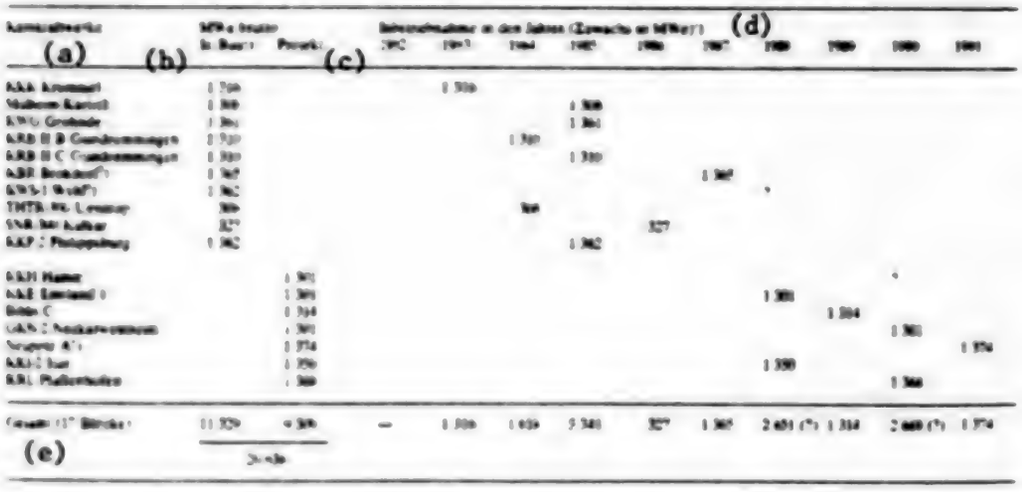
Introduction

The stagnation in the expansion of nuclear power plant capacity in the Federal Republic of Germany also continued in 1981, even though the start-up of the 1300 MWe Plant at Grafenrheinfeld (KKG) at the end of the year marked the first new operation of a nuclear plant in 3 years. However, in 1981 and in the first quarter of 1982, no construction approvals and no new orders were issued[1]. In the Federal Republic of Germany there are thus 15 nuclear power plant blocks in actual operation now, with a total of 10,358 MWe gross and 9,450 MWe net.

Efforts to accelerate the approval process for nuclear power plants were continued. On 14 October 1981, the Federal Government approved a catalog of criteria, coordinated with the provinces, which completed the examination announced by the Federal Chancillor in his governmental promulgation of 24 November 1980, how the approval procedures could be accelerated without impairing safety and legal protection. The process has been made more efficient here in a very significant aspect, because several power plants can be designed uniformly (standardization). On 11 February 1982, the Federal Minister of the Interior reported to the Parliament that he would grant to the responsible provincial agencies his approval, as required by the Atomic Law, for issuing the first partial construction

permit (TEG) for three nuclear power plant projects designed in this fashion ("Convoy"). This involves the projects KKE Emsland, KKI-2 Isar, and Biblis C.

Expected Start-up of Nuclear Power Plants in the FRG 1982-1991 (Status: March 1982)



Key:
a. Nuclear power plants
b. Under construction
c. Planned
d. Start-up in the years (increase in MWe)[1]
e. Total (17 blocks)

1) Date for transfer to the operator.
2) This is a listing of all installations for which the initial partial construction permit (TEG) has been issued.
3) Because of legal construction stops, the construction work was interrupted from 17 December 76 through 6 February 81.
4) Construction work has been interrupted since 19 February 75 (Occupation of the construction site and legal decision).
5) Start-up 6 years after effectiveness of the first TEG.
6) Because of delays in the approval process, the planning is being revised.
7) Of the two projects KKH and KKE, that one should be begun first which first receives an executable first TEG. The other one should then follow about 2 years later.

At this time (and at the end of 1981), 10 nuclear power plant blocks are thus under construction with a total of 11,329 MWe gross and 10,711 MWe net. With one of these plants (KWSWyhl), construction continues to be legally held up; in the appeal, the Superior Court at Mannheim, contrary to previous expectations, has as yet rendered no verdict. For the rest, the numerous superior court litigations which continue against nuclear power plants in 1981 have as yet caused no interruption of the construction work. Construction on the Brokdorf Nuclear Power Plant (KBR), which had been legally interrupted since December 1976, could again be resume on 6 February 1981. However, with the majority of installations under construction, a further delay of the expected dates for start-up has occurred. These are apparent from the tables "Expected Start-up of Nuclear Power Plants" and "New Nuclear Power Plants".

The number of nuclear power plant projects, which can be regarded as concretized, at this time comprises 10 blocks with a total of 13,211 MWe gross. Of this, applications for the first TEG have been submitted for 9 blocks (3 already in 1974, another 3 in 1975, and 1 each in 1977, 1978, and 1979). For 7 of these projects, with a total of 9309 MWe, the expected start-up dates vary between 1988 and 1991.

In summary, the following status (March 1982) emerges for nuclear power plants that are in operation, under construction, or being planned in the Federal Republic of Germany:

In operation	15 plants with	10,358 MWe gross
Under construction	10 plants with	11,329 MWe gross
Planned*	10 plants with	13,211 MWe gross
Total	35 plants with	34,898 MWe gross

*Of this, construction permits have been requested for 9 blocks with a total of 12,843 MWe, and orders (or letter of intent) for 4 blocks with 5,339 MWe.

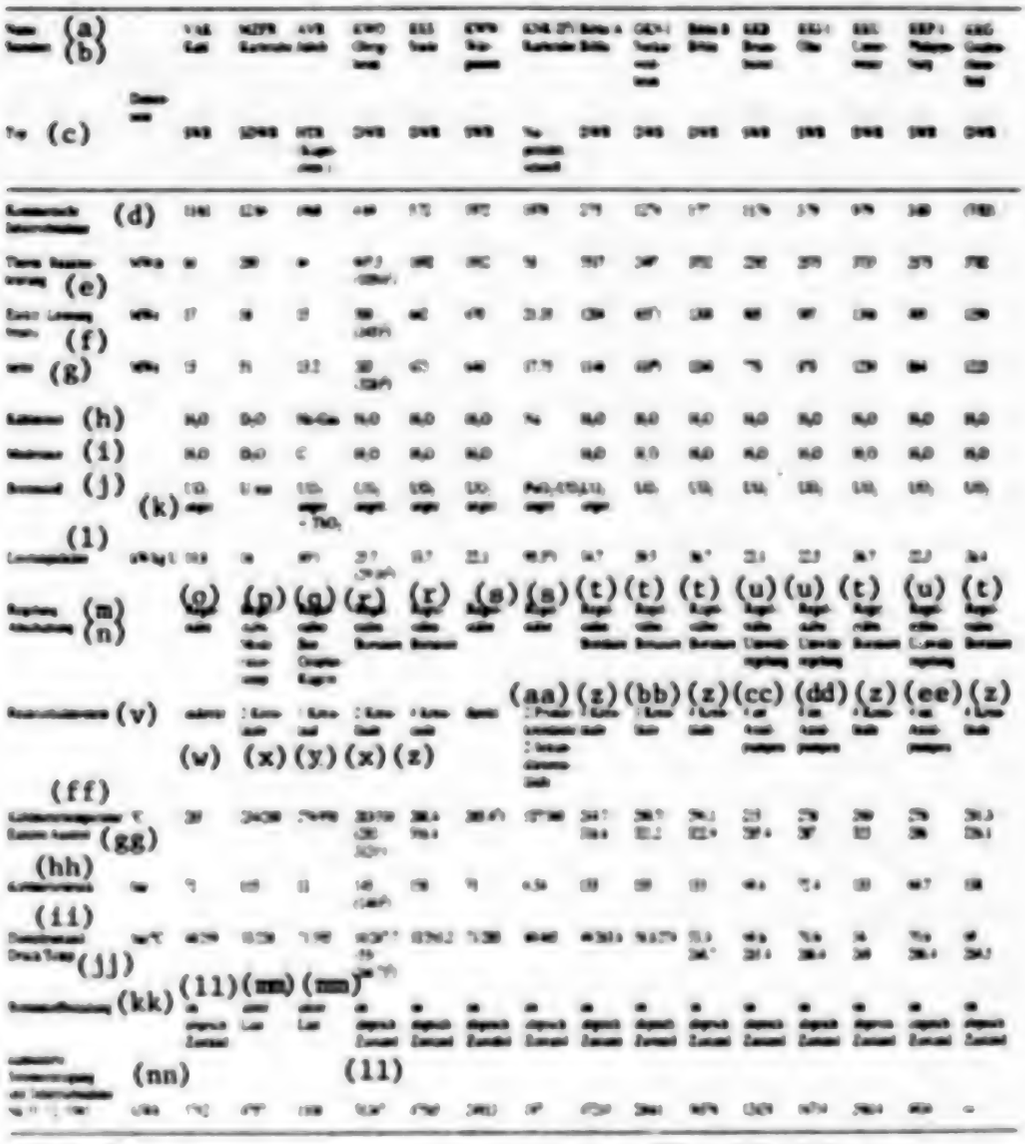
This ATW report and its tables are again based on replies from the utility enterprises and reactor construction companies to a questionnaire of the ATW, as well as on other information available to the editorial staff.

1. Nuclear Power Plants in Operation

A survey of the most important dates of the 15 nuclear power plants that are currently operating in the Federal Republic of Germany is given in the table below. Since the recently operational KKG will supply power only beginning in 1982, the gross power generation for 1981 derives from 14 blocks and amounts to 53,370,341 MWh. It therefore exceeded the previous year by 21.7 percent (1980: 43,857,329 MWh gross), and reached a fraction of 17.4 percent of the generation of the public power supply in the Federal Republic of Germany. The fraction of nuclear energy in the primary power consumption increased to about 4.6 percent (1980: 3.6 percent). As compared to the previous year, the total consumption was reduced by about 5 percent from 371 million t SKE (antracite units).

The highest gross generation among the German nuclear power plants in 1981 was again achieved by the KKU with 9548 GWh. As in the previous year, this was the highest generation of a nuclear power plant block in the world. Then followed Biblis B with 8594 GWh (simultaneously the second highest generation in the world in 1981), followed by Biblis A with 7245 GWh, GKN with 6355 GWh, KKB with 4688 GWh, KKS with 4657 GWh, KKI with 4337 GWh, KWW with 3793 GWh, and KWO with 2525 GWh.

Nuclear Power Plants in Operation in the Federal Republic of Germany
(Status: March 1982)



(Key on following page)

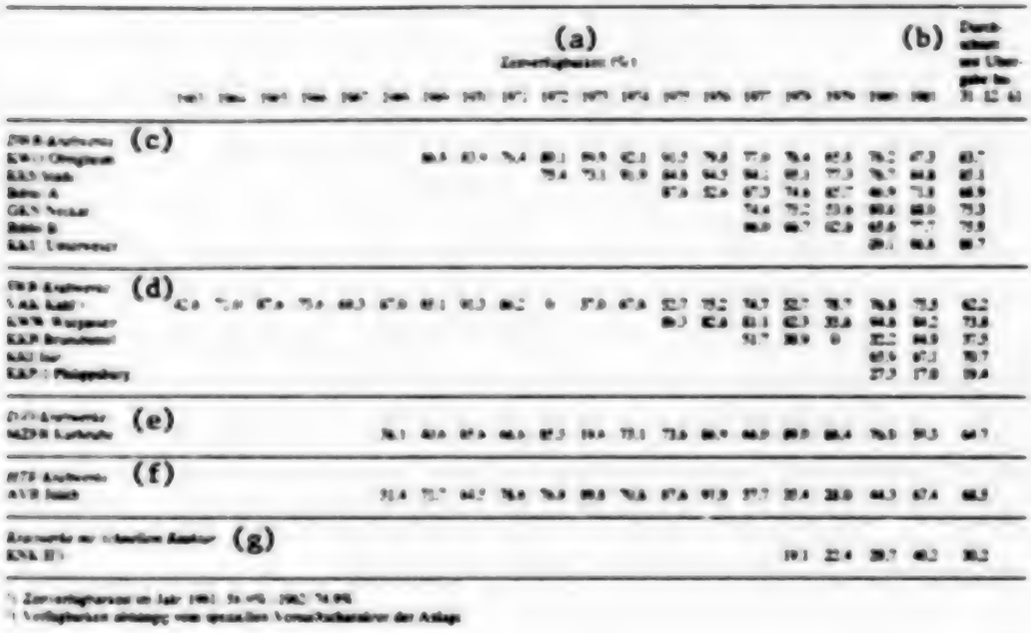
Key:

a. Name
b. Location
c. Type
d. Commerical Start-up
e. Thermal reactor power
f. Electrical power gross
g. Net
h. Coolant
i. Moderator
j. Fuel
k. Enriched
l. Power density
m. Regulation
n. Shutdown
o. Control rods
p. Control rods, moderator temperature
q. Control rods, boron-graphite balls
r. Control rods/boric acid
s. Control rods
t. Control rods/boric acid
u. Control rods/rotary control
v. Reactor cooling system
w. Indirect
x. 2 loops
y. 1 loop
z. 4 loops
aa. 2 primary loops, 2 secondary loops
bb. 3 loops
cc. 8 int. axial pumps
dd. 8 int. axial pumps
ee. 9 int. axial pumps
ff. Coolant temperature ^{o}C
gg. Entry/exit
hh. Coolant pressure
ii. Steam conditions:
jj. Pressure/temperature
kk. Fuel charge
ll. In the shutdown state
mm. Under load
nn. Cumulative power generation from start-up until 31 December 1981

1) kW/kg U + Th.
2) () after power increase.
3) As KNK-I with a thermal core in operation from 1973 to 1974.
4) U + Pu.
5) Exit from the pressure vessel.
6) () = planned.
7) Of this 698 MWe three-phase current (DS), 157 MWe traction current (BS)
8) Of this 653 MWe three-phase current, for traction current, the net equals the gross.

SWR = Boiling water reactor
SDWR = Heavy water pressurized water reactor
DWR = Pressurized water reactor
HTR = Gas cooled high temperature reactor

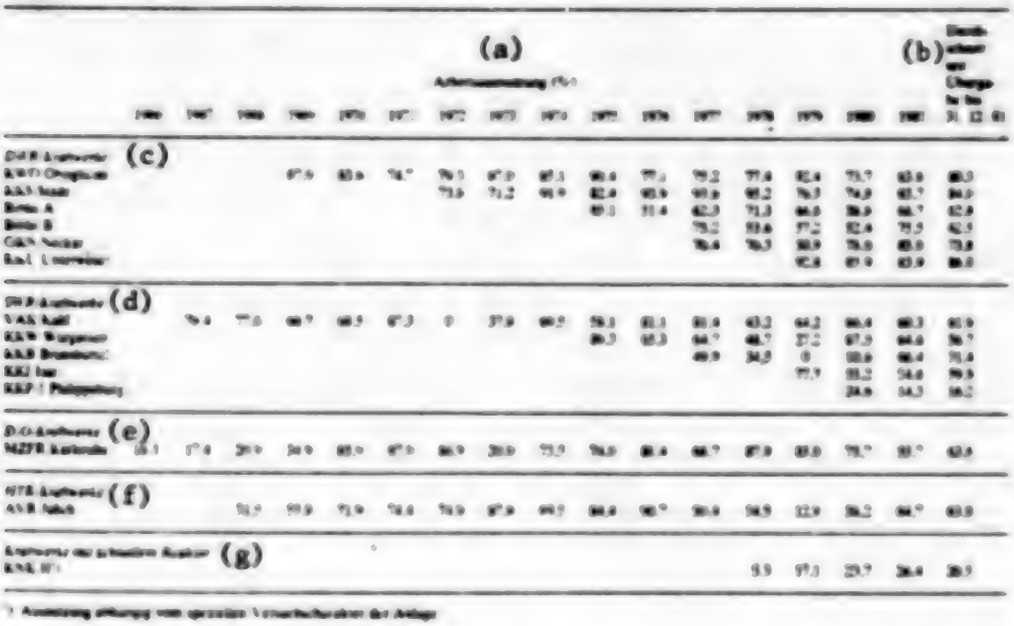
Time Availability of Nuclear Power Plants in the Federal Republic of Germany
31 December 1981



Key:
a. Time availability (percent)
b. Average from commission until 31 December 1981
c. DWR power plants
d. SWR power plants
e. D_2O power plants
f. HTR power plants
g. Power plants with fast reactor

1) Time availability in 1961: 58.9 percent; 1962: 74.9 percent
2) Availability depends on the special experimental character of the installation

Operational Utilization of Nuclear Power Plants in the Federal Republic of Germany Until 31 December 1981



Key:
a. Operational utilization (percent)
b. Average from commission until 31 December 1981
c. DWR power plants
d. SWR power plants
e. D_2O power plants
g. Power plants with fast reactor

1) Utilization depends on the special experimental character of the installation.

Part II of the ATW Report concerning new nuclear power plants in Europe will follow in the June issue (Number 6/82). It contains a comprehensive European survey as well as individual reports concerning the situation in another 25 countries of western and eastern Europe.

In 1981, GKN achieved the highest load fact with 0.85, followed by KKU, KWO, and KKS each with 0.84, Biblis B with 0.75, and Biblis A with 0.69, as can be seen from the table of operational utilization.

As regards time availability (see table), GKN with 88 percent occupied the top spot, followed by KKU and KWO with 87 percent, KKS and KKB with 85 percent, and KWW with 84 percent.

The total cumulative gross generation of all nuclear power plants in the Federal Republic of Germany since their respective start-up until 31 December 1981 was 318,147 GWh[2].

In Start-up

Grafenrheinfeld KKG, 1300 MW, DWR

After the first hot-test operation in November 1980, during which the primary loop was heated by means of the cooling pumps and the pressurizer was heated to 290°C, and was brought to an overpressure of 157 bar, the results of the tests run during this hot-test operation were analyzed and were evaluated with the TUV (Technical Monitoring Association). This evaluation yielded a series of reequipment and improvement measures, which were completely approximately by the end of March 1981. The further start-up process followed these activities. With the issuance of the charging permit on 26 June 1981 by the Bavarian Environmental Industry, the last precondition for inserting the 193 fuel elements into the reactor was fulfilled. After the reactor pressure vessel was closed, the second hot-test operation could then be started on 7 July 1981 by heating up the pressure vessel. The second hot-test operation is the most comprehensive test program for the total installation and represents the conclusion of conventional start-up. Besides copious tests on the primary loop and the auxiliary reactor systems, the water and steam systems and the turbo set are here being tested.

After conclusion and evaluation of the results of the second hot-test operation, operating approval was granted by the Bavarian State Ministry for Provincial Development and Environmental questions, on 10 November 1981. This fulfilled the precondition for initiating the first criticality, which was reached on 9 December 1981 at 21:11 o'clock. The subsequent zero-load phase led into the 5 percent power phase, which was started on 18 December 1981 and which was completed on 22 December 1981 with the synchronization of the generator, connected with a first power delivery into the 400 kV network.

During the Christmas holidays, the installation remained subcritically hot. From this condition, on 28 December 1981, the 30 percent power stage was achieved. From 31 December 1981 until 3 January 1982 it was interrupted, according to plan, but was continued on 4 January 1982. At times, a power of 180 MW could be delivered into the network during this period. Then followed the start-up stage to 50 percent rated power. The next power stage of 80 percent was begun on 1 March 1982. Operation with full power is to be achieved by the end of May 1982, the beginning of trial operation. The expected commissioning date will be the end of June 1982.

Owner and Operator: Bayernwerk AG.
Supplier Company: KWU; Reactor Manufacturer: KWU (Kraftwerk Union AG)
Data: 1299 MWe gross, 1225 MWe net, 3765 MWth; pressurized water reactor
Location: Grafenrheinfeld/Main, Landkreis Schweinfurt.
Contract Issued: 20 January 1975.
Permits: First TEG requested 7 June 1973, issued 21 June 1974,
first partial building approval 18 December 1974;
beginning of construction: January 1975
Start-up: First criticality 9 December 1981;
first power generation 22 December 1981;
commercial operation expected by mid 1982

New Nuclear Power Plants in the Federal Republic of Germany -

(Key on following page)

Key:
a. Running number
b. Designation
c. Owner or operator
d. Location
e. Electrical power MW
f. Gross
g. Net
h. Reactor power MWth
i. Reactor type
j. Boiling water
k. Pressurized water
l. Gas cooled pebble bed
high temperature
m. Na-cooled fast breeder

1) Transfer to the operator.
2) Prototype nuclear power plant with main financing from government agencies.
3) Construction work interrupted by legal decision from 20 October 1977 throuth the spring of 1979.
4) After the construction stop imposed on 17 December 1976, work was interrupted until 6 February 1981.
5) Construction work interrupted since 19 February 1975 because of site occupation by opponents of nuclear power plants and because of illegal decision of 14 March 1976.
6) Depends on the course of the approval procedure.
7) Because of the long delay of the approval procedure, the planning of an 855 MWe installation was changed to a 1300 MWe installation.
8) The German Parliament, on 14 December 1978, decided on a political approval reservation for the start-up of the SNR-300, concerning which a decision has not yet been made.
9) The owner agreed with the supplier corporation that the contract issued in 1975 should apply to that one of the two projects KKH or KKE, which first receives an executable first TEG. The other project should then presumably follow 2 years later.

Abbreviations:
BBC Brown, Boveri & Cie AG
BBR Brown Boveri Reaktor GmbH
CEGB Central Electricity Generating Board
EDF Electricite de France
ESK European Fast Breeder Nuclear Power Plants Ltd.
EVS Energy Utility Company, Schwabia AG
GKN Communicty Power Plant of Neckar Ltd.

Under Construction and Being Planned (Status: March 1982)

		(n)	(o)		(p)	(q)		(r)	(t)	(s) (u)
(v) (w)					KWU	KWU				
(v)										
(v) (x)					KWU	KWU				
(v)					KWU/Hochtief	KWU			(nn)	
(v)					KWU Hochtief	KWU				
(v) (y)					KWU	KWU			(oo)	
(v)					KWU	KWU				
(v) (z)					KWU	KWU				
(v)				(kk)		HRB			(pp)	
(v)						INTERATOM				
(aa)					KWU	KWU				
(bb)					(nn)	KWU				
(cc)					KWU Hochtief	KWU				
(dd)					KWU	KWU				
(ee)					KWU	KWU				
(ff)										
(gg)					KWU Hochtief	KWU				
(hh)										
(ii)										
(jj)						INTERATOM/ Belgonucleaire/ Framatome/KWU				

HEW Hamburgische Electricitäts-Werke AG
HKG Hochtemperatur Kernkraftwerk GmbH
HRB Hochtemperatur Reaktorbau GmbH
INB Internationale Natrium Brüter Reaktor Bau-Gesellschaft mbH
KBR Kernkraftwerk Brokdorf GmbH
KBU Kernkraftwerk Brunsbüttel GmbH
KKB Kernkraftwerke Gundremmingen Betriebsführungs GmbH
KKG Kernkraftwerke Grafenrheinfeld GmbH
KKI Kernkraftwerke Isar GmbH
KKK Kernkraftwerk Krümmel GmbH
KKP Kernkraftwerk Philippsburg GmbH
KLE Kernkraftwerke Lippe-Ems GmbH
KRB Kernkraftwerk RWE-Bayernwerk GmbH
KRL Kernkraftwerk RWE-LEW
KWG Gemeinschaftskernkraftwerk Grohnde GmbH
KWS Kernkraftwerk Süd GmbH
KWU Kraftwerk Union AG
LEW Lech Elektrizitätswerke AG
NWK Nordwestdeutsche Kraftwerke AG
OBAG Energieversorgung Oberbayern AG
PP Preussen AG
RWE Rheinisch-Westfälisches Elektrizitätswerk AG
RWE-PVOR RWE-PV Gesellschaft des Niederrheinischen Raums
SBK Schweizerische Brüter Kernkraftwerksgesellschaft mbH
SEP Interessenverband Elektrizitäts-Produzenten
SNR Schneller Natriumgekühlter Reaktor
TEG Teilerrichtungsgenehmigung
THTR Thorium-Hochtemperatur Reaktor
TWS Technische Werke der Stadt Stuttgart AG
VEW Vereinigte Elektrizitätswerke Westfalen AG

(Key on following page)

Key:

n. Status of the project
o. Letting of the contract (expected)
p. Total system
q. Supplier firm, reactor
r. Beginning of construction (expected)
s. Planned start-up[1)]
t. At the present
u. Upon letting of the contract
v. Under construction
w. First TEG 18 December 73, building approval 7 June 74
x. First TEG 8 June 76, construction work interrupted by legal decision from 20 October 77 through March 1979
y. First TEG 25 October 76, construction work interrupted by legal decision from 17 December 76 through 6 February 81
z. First TEG 22 January 75, construction work interrupted by building site occupation and legal decision since 19 February 75
aa. Contract granted, first TEG applied for on 23 June 75, applied for again because of plan changes on 5 August 81
bb. First TEG applied for on 17 August 78, applied for again after planning changes on 28 November 80, planning contract granted
cc. Contract granted, first TEG applied for on 18 April 75, applied for again because of planning changes on 10 October 1980
dd. Space arrangement procedures concluded December 1979, Letter of Intent issued on 30 January 1980, first TEG applied for on 13 February 79
ee. Planning contract granted, first TEG applied for on 23 June 75, applied for again because of planning changes on 27 November 1980
ff. Letter of Intent on 30 April 77, contract granted, first TEG applied for on 16 June 77
gg. Offers received beginning 1975, site decision requested 23 November 78, first TEG applied for 29 November 74
hh. Carrier corporation KRL founded in October 1975, space arrangement procedures concluded on 8 October 81
ii. Construction permit requested on 11 September 74
jj. Preliminary planning
kk. October 1971
ll. INB Internation Breeder Reactor Construction Company Ltd, Bau-Arge KKW Kalkar
mm. (Approval application on the basis of KWU pressurized water KW)
nn. Middle of 1984
oo. Beginning of 1985
pp. Fall of 1984

HEW Hamburgische Electricitats-Werke AG (Hamburg Electrical Works Inc.)
HKG Hochtemperatur-Kernkraftwerk GmbH (High Temperature Nuclear Power Plant Ltd.)
HRB Hochtemperatur-Reaktorbau GmbH (High Temperature Reactor Construction Ltd.)
INB Internationale Natrium-Brutreaktor-Baugesellschaft mbH (International Sodium Breeder Reactor Construction Company Ltd.)
KBG Kernkraftwerk-Betriebsgesellschaft mbH (Nuclear Power Plant Operating Company, Ltd.

KBR Kernkraftwerk Brokdorf GmbH (Brokdorf Nuclear Power Plant, Ltd.)
KGB Kernkraftwerke Gundremmingen Betriebs-GmbH (Gundremmingen Nuclear Power Plant Operating Company, Ltd.)
KGV Kernkraftwerke Gundremmingen Verwaltungs GmbH (Gundremmingen Nuclear Power Plant Management Company, Ltd.)
KKB Kernkraftwerk Brunsbüttel GmbH (Brunsbüttel Nuclear Power Plant Ltd.)
KKE Kernkraftwerk Emsland (Emsland Nuclear Power Plant)
KKH Kernkraftwerk Hamm (Hamm Nuclear Power Plant)
KKI Kernkraftwerk Isar GmbH (Isar Nuclear Power Plant, Ltd.)
KKP Kernkraftwerk Philippsburg GmbH (Philippsburg Nuclear Power Plant, Ltd.)
KLE Kernkraftwerke Lippe-Ems GmbH (Lippe-Ems Nuclear Power Plant, Ltd.)
KRB Kernkraftwerk RWE-Bayernwerk GmbH (RWE Bavarian Work Nuclear Power Plant, Ltd.)
KRL Kernkraftwerk RWE-LEW (RWE-LEW Nuclear Power Plant)
KWG Gemeinschaftskernkraftwerk Grohnde GmbH (Grohnde Community Nuclear Power Plant, Ltd.)
KWS Kernkraftwerk Süd GmbH (South Nuclear Power Plant, Ltd.)
KWU Kraftwerk Union AG (Union Power Plant, Inc.)
LEW Lech-Electrizitätswerke AG (Lech Electrical Works, Inc.)
NWK Nordwestdeutsche Kraftwerke AG (Northwest German Power Plants, Inc.)
OBAG Energieversorgung Ostbayern AG (Eastern Bavarian Energy Utility, Inc.)
PW Pfalzwerke AG (Pfalz Works Inc.)
RWE Rheinisch-Westfalisches Elektrizitaswerk AG (Rhenish-Westphalia Electrical Works, Inc.)
RWE-PWGbR RWE-PW Gesellschaft des bürgerlichen Rechts (RWE-PW Corporation of the Public Law
SBK Schnell-Brüter-Kernkraftwerksgesellschaft mbH (Fast Breeder Nuclear Power Plant Company, Ltd.)
SEP Samenwerkende Electriciteits Productiebedrijven
SNR Schneller Natriumgekühlter Reaktor (Fast Sodium-Cooled Reactor)
TEG Teilerrichtungsgenehmigung (Partial Approval Permit)
THTR Thorium-Hochtemperatur-Reaktor (Thorium High Temperature Reactor)
TWS Technische Werke der Stadt Stuttgart AG (Technical Works of the City of Stuttgart Inc.)
VEW Vereinigte Elektrizitatswerke Westfalen AG (United Electrical Works of Westphalia Inc.)

2. Nuclear Power Plants Under Construction

Krümmel KKK 1300 MW SWR

The course of the approval procedure for the Krümmel Nuclear Power Plant (KKK) was a satisfactory one in 1981. At no time was work at the construction site hindered by the lack of approvals or assembly permits.

The 12th partial permit (TEG) was granted on 20 January 1981 - it essentially comprises clear safety changes such as the construction of an external monitoring system, of a reactor building gate that is safe against air crashes, and a second cooling water pumping house with an associated intake structure. This once again clearly increased the activity on the construction site. An

important key date could be reached with the flushing of the nuclear auxiliary systems. Test runs on a series of systems were connected with the flushing program. The second integral pressure test of the pressure vessel and the connecting pipeline within the containment could be performed on 12 July 1981 just as successfully as the reactor well and drier and separator storage pool long-term tests. The comprehensive program of quality-improving measures (among other things, selected round seams were polished by means of an interior tube grinding machine) were concluded. The cold test that was originally planned for the middle of December 1981 had to be postponed by 4 months, among other reasons, because of problems with "pipeline supports", so that the transfer date will be delayed until August 1983.

The 13th TEG was requested on 6 August 1981 and was granted on 20 January 1982. It primarily concerned system safety, diesels 3 and 4, E and M engineering, the second cooling water pumping house, activity instrumentation, and fuel element handling.

Besides the construction activity, there took place preliminary operating tests, pressure tests, partial and total start-ups of individual systems.

The 14th TEG essentially concerns safety systems, the reactor pressure vessel built-ins/Part 2, nuclear components including fuel elements, and operation of the system. In October 1981, a public process was initiated for this TEG, for which the updated safety report for the total system was presented. The presentation within the framework of the public process was concluded on 28 December 1981; approximately 6,100 objections were received.

Owner and Operator: Kernkraftwerk Krümmel GmbH (HEW 50 percent, NWK 50 percent). Management: HEW.
Supplier Company: KWU; Reactor Manufacturer: KWU.
Data: 1316 MWe gross, 1260 MWe net, 3690 MWth; boiling water reactor.
Location: Krümmel/Elbe at Geesthacht.
Granting of Contract: Letter of Intent 31 January 1972; Contract: 17 July 1972.
Approval: First TEG 18 December 1973; beginning of construction 2 January 1974.
Start-up: August 1983.

A detailed description of the system together with technical data can be found in ATW 20, pp 66-73 (February 1975).

Mülheim-Kärlich 1300 MW DWR

Building and assembly work was continued in 1981 at the Nuclear Power Plant Mülheim-Kärlich. All the rough construction work has practically been concluded, with the exception of the janitor and garage building with the integrated information center, which will be completed in 1982. The pressure test of the containment was successfully performed in the summer of 1981.

Upon receipt of the fifth TEG in June 1981, a beginning could be made with the assembly of the primary loop. This will be completed in the spring of 1982.

Inasmuch as construction permits exist, the assembly of the components and systems is being continued as much as possible. The turbo set is almost completely installed.

A construction permit is still necessary for the final completion of the system. This concerns mainly the auxiliary reactor systems and secondary systems as well as reactor protection, as well as a fuel element handling permit. A trial run and operating permit must follow.

On the basis of plan changes with respect to the safety report of 1973, a second explanation date took place in February 1981. Thereupon, the approval agency granted a second TEG (second decision) by means of which the changes were approved.

Start-up is planned for the end of 1985.

Owner: RWE.
Deliverying Firm: Konsortium BBC/Brown Boveri Reaktor GmbH (BBR); reactor manufacturer: BBR.
Data: 1308 MWe gross, 1223 MWe net, 3760 MWth; pressurized water reactor.
Location: Mülheim-Kärlich/Rhein at Koblenz.
Granting of the Contract: Letter of Intent 23 October 1972, Contract 9 January 1973.
Approval: First TEG applied for 22 December 1972, issued 14 January 1975; beginning of construction: 16 January 1975.
Start-up: End of 1985.

A detailed description of the installation together with technical data can be found in atw 20, pp 245-250 (May 1975).

Grohnde KWG 1350 MW DWR

The Social Minister of Lower Saxony, on 7 May 1981, granted the fourth partial construction approval (TEG) and on 23 December 1981 granted the fifth TEG to construct the Grohnde Nuclear Power Plant (KWG). Thus all the reactor auxiliary systems and secondary systems, electrical systems of control technology, and of measurement and regulation technology, the main lifting tools, as well as parts of the secondary system have been approved. The sixth TEG, which essentially comprises the assembly of the major components and of the primary loop, is expected in the spring of 1982. The district government of Hannover, on 16 June 1981, issued water rights to withdraw and reintroduce cooling water and to eliminate operating water into the Weser.

The construction crew was increased to 1500 workers, as a result of the activities that were initiated by the above steps. The rough construction work on all the buildings of the off-air chimney and the two 146 m high cooling towers are concluded except for the dome of the reactor building. The steel casing was closed by welding the pole sheet. In nearly all the building, pipeline assembly is the focal point of the work. The in-house switching systems are

already being supplied through outside mains transformers. The water preparation system is just about ready to start up.

Start-up of the nuclear power plant is now planned for 1985.

Builder and Operator: Gemeinschaftskernkraftwerk Grohnde GmbH (Preussiche Elektrizitäts AG 50 percent, Gemeinschaftskraftwerk Weser GmbH 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1361 MWe gross, 1294 MWe net, 3765 MWth; pressurized water reactor
Location: Emmerthal/Weser locality of Grohnde.
Granting of the Contract: Letter of Intent 8 February 1974
Contract 19 June 1975
Approval: First TEG requested 3 December 1973, granted 8 June 1976; beginning of construction: June 1976; construction interrupt by legal decision from 20 October 1977 until March 1979
Start-up: 1985

Gundremmingen KRB II B and C 2 · 1300 MW SWR

The first partial construction permit for the Nuclear Power Plant KRB II in Gundremmingen was granted on 19 July 1976 by the Bavarian State Minister for Provincial Development and Environmental Questions. The construction work was begun immediately thereafter on 20 July 1976.

With the fifth TEG, which was issued in November 1981, assembly of the machine and electrical systems has become possible but for a few exceptions. The rough construction of the main buildings is completed. The construction measures are running in parallel to machine and electrical assembly at a good rate.

In Block B, on 13 November 1981, a pressure test was successfully performed on the reactor pressure vessel. Besides the assembly of the reactor pressure vessel built-ins, assemblies and pressure tests were concluded on the machine systems, up to about 20 percent. The in-house requirements of Block B has been put into operation and is is under voltage. At this time, the cabling runs in the direction of process-technical loads. A beginning was made with electrical and guidance start-up. The turbo set of Block B is finished about 80 percent.

In Block C, the last welding seam of the reactor pressure vessel was final-annealed. The preparatory work for the pressure test, which is planned for the middle of 1982, is in progress. The internal switching of Block C is anticipated for June 1982. The capacitors of the turbo set are ready. A beginning was made with assembling the turbine and the generator.

Two further construction permits for the construction of the remaining auxiliary and secondary systems and for the compact storage of fuel elements are still expected in 1982. For the beginning of 1983, the fuel element handling permit will become necessary, and by the end of 1983 the operating permit.

As a consequence of the massive pipeline and component assembly as well as the start-ups, 3,000 persons are employed at the site.

The date for transfer of the Block B, if the permits are approved at the proper time, will be the middle of 1984 according to present perspectives.

For Block C, the assembly work is progressing in such a way that, with a delay of 8 months with respect to Block B, a transfer date at the beginning of 1984 is being hoped for.

Builder: Kernkraftwerke Gundremmingen Verwaltungsgesellschaft mbH (KGV)
Operator: Kernkraftwerke Gundremmingen Betriebsgesellschaft mbH (KGB) (RWE 75 percent, Bayernwerk 25 percent).
Deliverying Firm: Arge KWU/Hochtief; reactor manufacturer: KWU.
Data: 2 · 1310 MWe gross, 2 · 1244 MWe net, about 2 · 3840 MWth; boiling water reactor SWR-72.
Location: Gundremmingen/Donau, District of Günzburg.
Granting of the Contract: Letter of Intent 25 February 1974, Contract 14 May 1975
Approval: First TEG requested 15 March 1974, granted 19 July 1976; Beginning of construction: July 1976.
Start-up (Transfer): Block B middle of 1984, Block C beginning of 1985.

Brokdorf KBR 1350 MW DWR

The construction work for the Brokdorf Nuclear Power Plant (KBR) was begun on 26 October 1976, after the responsible ministries of the Province of Schleswig-Holstein, on 25 October 1976, issued the first partial construction approval (TEG) for the construction site equipment and for the foundation work of the reactor building. Because of a legal decision on 17 December 1976, work had to be stopped again. It could only be resumed on 6 February 1981. On 19 February 1981, the second TEG was issued, which comprises the rough construction of the reactor, auxiliary systems, and switching system buildings as well as the erection of the containment. On 26 February 1981, the first large pillar for the reactor foundation was set down.

From 23 June to 23 August 1981, a revised safety report was presented. On 8 January 1982, the third TEG was issued, which permits the completion of the construction work on the machine house, the cooling water building, and auxiliary buildings.

In the middle of October 1981, the pillar foundation work for the reactor-, auxiliary system-, and the switching system-buildings was completed. The work for enclosing the building excavations then began, the excavation and armoring of the piled head plate, which is the actual foundation of the reactor building. The pouring of the concrete for this took place in a concentrated continuous action of about 100 hours' duration, which was concluded on 8 February 1982.

The assembly of the spherical steel containment should be begun on this foundation by the middle of 1982. As soon as the weather allows after the end of the winter, the erection of parts of the high rise structures will be begun. These parts belong to the reactor building. The construction work associated with the second and third TEG should take about 3 years.

The fourth TEG for the erection of the machine and electrical equipment is expected by the owner around the turn of the year 1982/83.

The investment volume of the KBR, according to the present cost status, is about 3 billion DM. Of this, about 550 million DM pertain to the construction part, and of this again 150 million DM has already been assigned for the rough construction work. The assignment of the remaining work of the construction part is in view by the end of 1982. Altogether, contracts in excess of 600 million DM were granted besides the rough construction, essentially for machine and electrical components with a long delivery time.

The number of employees at the construction site was about 600 by the end of 1981. It then was temporarily reduced to about 500, but will exceed 1,000 by the middle of 1982.

With rapid progress of the work, and of the approvals, start-up of the KBR is expected for 1986/87.

Builder and Operator: Kernkraftwerk Brokdorf GmbH (KBR) (NWK 50 percent, HEW 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1365 MWe gross, 1290 MWe net, 3776 MWth; pressurized water reactor.
Location: Brokdorf/Elbe.
Granting of the Contract: 19 June 1975.
Approval: First TEG requested 12 March 1974, granted 25 October 1976; Beginning of construction 26 October 1976, interrupted by legal decision from 17 December 1976 to 6 February 1981.
Start-up: 1986/87.

Philippsburg KKP-2 1350 MW DWR

The responsible approval agency of the Province of Baden-Württemberg, on 26 August 1981, issued the fifth partial erection permit (TEG) for the Philippsburg Nuclear Power Plant Block 2 (KKP-2). It also allowed various supplements to previously granted permits. What was approved was essentially the total electrical and guidance technology and the nuclear and conventional auxiliary systems, except for the after-heat dissipation systems.

The rough construction work on the block buildings has been essentially concluded. The finishing building work and the ventilation channel assembly in the reactor auxiliary systems building, the machine house, and the switching systems building was continued.

The reactor building is finished in rough construction to such an extent that the rotary crane could be brought in. The assembly of the reactor containment is almost completed. A beginning has been made with construction work on the fittings chamber.

In the machine house, assembly of the components and pipelines could be begun. The feed water container has been welded. In the switching systems building, erection of the switching systems and assembly of the cable construction has been begun.

Builder and Operator: Kernkraftwerk Philippsburg GmbH (KKP) (Badenwerk 50 percent, EVS 50 percent).
Delivering Firm: KWU; Reactor manufacturer: KWU.
Data: 1362 MWe gross, 1281 MWe net, 3765 Mwth; pressurized water reactor.
Location: Philippsburg/Rhein(Rheinschanzinsel).
Granting of the Contract: 17 June 1975
Approval: First TEG granted 6 July 1977
Beginning of construction: 7 July, 1977
Start-up: 1985.

WYHL KWS-1 1350 MW DWR

The construction for the South Nuclear Power Plant at Wyhl (KWS) could not yet be resumed in 1981, since the appelate process before the 10th Senate of the Superior Court of Baden-Württemberg (VGH) in Mannheim could not be concluded. This legal process concerns the building stop ordered by the first instance, the District Court of Freiburg, on account of the lack of bursting protection. In November 1981, the pleadings were completed. Before this, in September 1981, the presentation of evidence was concluded on two dates, in the area of reactor safety and radioecology. A judgment is expected in the spring of 1982.

The contract of June 1975, to the Kraftwerk Union AG (KWU), concerning delivery of the nuclear power plant, is quiescent at this time.

Builder: Kernkraftwerk Süd GmbH (KWS) (Badenwerk 50 percent, EVS 50 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1362 MWe gross, 1284 MWe net, 3765 MWth; pressurized water reactor.
Location: Wyhl/Rhein.
Granting of the Contract: Letter of Intent April 1973, Contract 27 June 1975
Approval: First TEG requested 10 October 1973, granted 22 January 1975;
Beginning of construction: 17 February 1975. Construction work interrupted since 23 February 1975 after occupation of the terrain by opponents of nuclear power plants and due to a legal decision of 14 March 1977.

Uentrop THTR-300 300 MW HTR

During the course of its erection time, the expected completion date of the THTR-300 Nuclear Power Plant in Hamm-Uentrop with helium-cooled thorium high-

temperature reactor has often been delayed. The contractual erection time of the nuclear power plant, at the beginning of construction, and including start-up, was 61 months. This resulted in a date of 1 March 1977 for transfer to the operator. Because of the current delays, which essentially were based on the adaptation of the project to respectively the most recent state of science and technology, as well as on the prototype character of the power plant, and as a result of further delays in the approval procedure, a new correction of the schedule plan has become necessary. For 2 years, 1 151-month time plan - including start-up and trial operation - is now the basis for the construction. This implies a transfer date to the operator on 1 September 1984. The pressure test of the reinforced concrete container is planned for November 1982, the beginning of start-up for the second quarter of 1983. Important partial erection permits were issued in 1981, especially for the shutdown equipment with the supply system, the water-steam loop, and the auxiliary and secondary cooling water loops. These were required to continue the construction work.

On the machine side, the following building progress was achieved in 1981: Assembly of the six steam generators has been concluded, all shutdown equipment has been assembled (42 core rods and 36 reflector rods), work on the air guidance wall (preliminary assembly and assembly) has been 50 percent completed, the essential major components of the secondary loop are finished assembled, and assembly of the pipelines and water-steam loop has been begun. Assembly of the cooling water lines in the reactor hall is being continued according to plan. For the gas purification system, assembly of pipelines and valves is being implemented. In the charging system, a beginning has been made with laying the pipelines and with preparing the assembly for the dust collection vessel.

For the completion of the THTR, still further partial erection approvals will be required in 1982, which essentially comprise machine-engineering auxiliary systems, electrical and guidance systems. Furthermore, the first partial operating permit is required.

The previously outstanding legal complaint against the partial erection permit for the steam generator, cooling gas blower, and steam generator leakage control is currently not being treated further by the Arnsberg District Court, since the decision of the Münster Superior Court in the matter of the feed water container is still outstanding.

Because of the cost increases of the project and the budget difficulties of the Federal Government, problems in the financing of the THTR until its completion have arisen in 1981. However, up to now these have not had a significant effect on the progress of the work.

Owner: Hochtemperatur-Kernkraftwerk GmbH (HKG).
(A coalition of regional and communal electrical utility enterprises: Gemeinschaftskraftwerk Weser GmbH. Veltheim (26 percent); Kommunales Elektrizitätswerk Mark AG, Hagen (26 percent); Vereinigte Elektrizitatswerke Westfalen AG, Dortmund (26); Gemeinschaftswerk Hattingen GmbH, Hattingen (12 percent); Stadtwerke Aachen AG, Aachen (5 percent); Stadtwerke Bremen AG, Bremen (5 percent)).

Delivering Firm: Konsortium THTR (Brown, Boveri & Cie AG, secondary part; Hochtemperatur-Reaktorbau GmbH, primary part; NUKEM GmbH, fuel elements); reactor manufacturer: Hochtemperatur-Reaktorbau GmbH (HRB).
Data: 307.5 MWe gross, 296 MWe net, 768 MWth; with helium gas-cooled spherical pile thorium high temperature reactor.
Location: Uentrop-Schm ehausen (District of Unna).
Granting of the Contract: Letter of Intent July 1970, contract 29 October 1971.
Approval: First TEG requested January 1970, granted May 1971;
Beginning of construction: May 1971, delivery time beginning 1 February 72.
Start-up: 1983/84

A detailed description of the installation together with technical data is given in ATW 16, pp 238-245 (May 1971).

Kalkar SNR-300 300 MW Fast Breeder

With the 300-MWe prototype Fast Breeder Nuclear Power Plant SNR-300 in Kalkar, the rough construction work, except for work on the cooling tower whose approval is expected in the spring of 1988, will essentially be completed in the next few months.

At this time, the technical auxiliary machine systems, which were approved in the first supplement to the third partial erection permit (TEG) in the middle of 1981, as well as the electrical and guidance system components are being mounted. Part of this work as well as the insertion of the double tank, which was approved simultaneously with the reactor cell built-ins, could be completed. Thus, on 6 October 1981, it was possible to switch in the in-house requirements from the high voltage network. The assembly of the system components for accident control and after-heat dissipation, which were approved with the fourth TEG, is in progress. A part thereof, such as the tertiary components in the steam generator housings, can be mounted only during the next year because, on the basis of more stringent requirements on the part of the experts and agencies, new finishing production and improvements had to be contracted for.

The issuance of the still outstanding seventh supplement to the second TEG, essentially for the steel casing, is expected shortly. The last expert opinions are being presented for the fifth TEG, which mainly comprises the systems of the nuclear power plant section, so that approval is expected for July 1982.

On the basis of the current approval status, start-up of the power plant in the year 1986 is possible. However, on 14 December 1978, Parliament decided on a political reservation of approval for the inception of operation. According to the report of the Enquete Commission "Future Nuclear Energy Policy", which is scheduled for 1982, Parliament will make a decision on this matter.

Furthermore, since the beginning of 1981, problems exist concerning financing the SNR-300 to its completion, as a consequence of cost escalations of the project to more than 5.4 billion DM and difficulties with the federal budget. The Federal Minister for Research and Technology (BMFT) requested an additional

participation of the electrical utility enterprises in the amount of about 1.1 billion DM. The tedious negotiations up to now have resulted in conditional promises in the amount of 930 million DM; however, no definite decision has been reached. The new governments in Belgium and in the Netherlands have in principle indicated their readiness of increasing their higher contributions, from the already approved approximate 333 million DM each to about 470 million DM (which corresponds to the original participation rate in a total cost level of about 3.4 billion DM). The Federal Cabinet up to now has considered the SNR financing three times (on 23 September and 16 December 1981 and on 17 February 1982). In view of an impending building stop for lack of money, the BMFT, at the beginning of October 1981, granted a partial approval for 167 million DM to continue the work until the end of the year. In February 1982, the Federal Government approved an increase of its obligations in the amount of 500 million DM for further construction until about September 1982. However, of this 340 million DM must be requested as extra funds for the 1982 fiscal year.

The approval of the electric utilities as well as the effectiveness of interim financing depend on a positive decision concerning the SNR on the part of Parliamet after the summer recess. Again the on-time completion of the Enquete Commision report by 31 July 1982 is a precondition for this. The electrical utilities, in their negotiations, have also named the condition that the costs be passed on to the electrical consumers in a proportion that is uniformly distributed among all the participants.

Builder and Operator: Schnell-Brüter-Kernkraftwerksgesellschaft mbH (SBK) RWE (D) 68.85 percent, Electronucleaire (B) 14.75 percent, SEP (NL) 14.75 percent, CEGB (GB) 1.65 percent.
Delivering Firm: INB Internationale Natrium-Brütreaktor-Bau GmbH (INTERATOM (D) 70 percent, Belgonucleaire (B) 15 percent, Neratoom (N) 15 percent. Construction part: Arge Kernkraftwerk Kalkar (Hochtief AG AG (D), ASTROBEL General Contractors S.A. Anc. Auxeltra Genie Civil S.A., Compagnie d'Entreprises C.F.E. (B), Hollandsche Beton Maatschappij N.V. (NL)).
Data: 327 MWe gross, 295 MWe net, 762 MWth; sodium-cooled fast breeder.
Location: Kalkar/Rhein (District of Kleve).
Granting of the Contract: Letter of Intent 23 March 1972, Contract 10 November 1972.
Approval: First TEG granted 18 February 1972;
Beginning of construction: 24 April 1973.
Start-up: 1986 (pending Parliamentary approval)

Detailed description of the system with technical data in the ATW special issue on the SNR-300 (July 1972) and ATW 18, pp 411-414 (Aug./Sept. 1973).

3. Planned Nuclear Power Plants

HAMM KKH 1300 MW DWR

On 23 June 1975, the Kernkraftwerk Hamm GmbH (KKH) of that time, now called Kernkraftwerke Lippe-Ems GmbH (KLE), granted the contract for delivery of a 1300 MWe nuclear power plant with a pressurized water reactor to the Kraftwerk Union AG (KWU).

At the same time, the owner requested erection and operation of the system according to Paragraph 7 of the Atomic Law. Although the experts that had been appointed by the approval agency of the Province of North Rhine-Westphalia had already sometime before that given their opinions as regards the location and design, the first partial erection permit (TEG), which was expected by June 1976, has to date not been issued.

On 17 August 1978, the owner requested erection of the Nuclear Power Plant Block "Emsland" (KKE) near Lingen in Lower Saxony. After this, agreement was reached with the supplier firm to let that one of the contracts for the two projects KKH or KKE become effective which first receives an executable TEG. The other project should then presumably be put in operation two years later.

In November 1980, the approval agency of the Province of North Rhine-Westphalia for the first time indicated in writing that it would be ready to resume processing the approval application. Thereupon, a new approval application according to Paragraph 7 of the Atomic Law was presented with updated application documents in order to facilitate the dispatch of the procedures. This occurred on 5 August 1981. Since that time, according to the directives of the Atomic Law Process Ordinance, the approval agency has initiated the approval process and has appointed technical experts. Start-up of the KKH should occur about 70 months after beginning of construction.

Owner and Operator: Kernkraftwerke Lippe-Ems GmbH (KLE) (VEW 74 percent, Elektromark 26 percent).
Delivering Firm: KWU; reactor manufacturer: KWU
DATA: 1303 MWe gross, 1231 MWe net, 3675 MWth; pressurized water reactor
Location: VEW-Kraftwerk Westfalen in Hamm-Uentrop.
Granting of the Contract: 23 June 1975
Approval: First TEG requested 23 June 1975, new application because of plan changes on 5 August 1981.
Start-up: About 70 months after beginning of construction.

Emsland KKE 1300 MW DWR

On 17 August 1978, the Kernkraftwerke Lippe-Ems GmbH (KLE) together with the Kraftwerk Union AG (KWU) made application for the erection and operation of a 1300 MW nuclear power plant with a pressurized water reactor. The site is in in the immediate vicinity of the existing VEW operating terrain and within the

area of the city of Lingen (Ems), Darme County, Emsland Province. The planned nuclear power plant in Emsland (KKE) is currently undergoing various steps of the approval process. The activities of the KWU are being furnished within the framework of a planning contract. However, already in 1978, the owner agreed with the KWU that the contract granted for the Hamm Nuclear Power Plant (KKH) should be applicable to that one of the two projects KKH or KKE which first receives an executable TEG. The other project should then presumably follow 2 years later.

After updating the application documents in the fall of 1980 within the framework of an alteration application and a renewed public presentation of the application documents in January and February 1981, the Atomic Law hearing date took place in May 1981.

In the meantime, the expert opinions that had been presented within the framework of the Atomic Law approval process could essentially be completed. The accompanying approval procedures also have progressed to such a point that fulfillment of the preconditions can be expected so as to begin construction in 1982. On 12 February 1982, the Federal Minister of the Interior gave his approval, as required by the Atomic Law, for granting the first TEG for KKE to the Lower Saxony Provincial Agency.

Start-up of the KKE should occur about 70 months after beginning of construction.

Owner and Operator: Kernkraftwerke Lippe-Ems GmbH (KLE) (VEW 74 percent, Elektromark 26 percent).
Delivering Firm: KWU; reactor manufacturer: KWU (as basis for the approval application)
Data: 1291 MWe gross, 1222 MWe net, 3675 MWth; pressurized water reactor
Location: Lingen/Ems.
Granting of the Contract:

Approval: First TEG applied for in August 1978; approval for water rights requesting in 1975, requested again after plan changes on 28 November 1980, energy-economic approval granted January 1980, Beginning of construction: planned in 1982
Start-up: About 70 months after beginning of construction (1988?).

Biblis C 1300 MW DWR

On 18 April 1975, the Rheinisch-Westfälische Elektrizitätswerk AG (RWE) requested the Hessian Ministry for Economy and Technology to permit the erection and operation of Block C of the Biblis Nuclear Power Plant within the framework of the Atomic Law approval procedure. Two months later on 24 June 1975, the companies Kraftwerk Union AG (KWU) and Hochtief AG were commissioned to set up a turnkey ready 1300 MWe nuclear power plant with a pressurized water reactor.

On 10 October 1980, the approval request of 18 April 1975 for erection of Block C (and originally also Block D) was withdrawn. Because of plant changes

that occurred in the meantime, an application for Block C was in any case submitted anew, using as a basis a new safety report.

On 12 February 1982, the Federal Minister of the Interior gave his approval to the Hessian Provincial Agency, as required by the Atomic Law, for granting the first TEG for Biblis C.

Construction of the Plant should begin in 1982/83. Transfer to the owner is not expect for 1989/90.

Owner and Operator: Rheinisch-Westfälisches Elektrizitätswerk AG (RWE).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1303 MWe gross, 1228 MWe net, 3765 MWth; pressurized water reactor
Location: Biblis/Rhein.
Granting of the Contract: 24 June 1975.
Approval: First TEG requested 18 April 1975, new request because of plan changes 10 October 1980; beginning of construction: Planned 1982/83.
Start-up: 1989/90.

Isar-2 KKI-2 1350 MW DWR

In December 1979, the space arrangement process for the second block of the Nuclear Power Plant at Isar (KKI-2) was concluded at Ohu, Landshut County. The system is being jointly erected and jointly operated by the Bayernwerk AG (40 percent), the Landeshauptstadt München - Stadtwerke (25 percent), the Isar Amperwerke AG (25 percent), and the Energieversorgung Ostbayern AG (OBAG) (10 percent). At the beginning of 1979, application for the KKI-2 was made in accord with Paragraph 7 of the Atomic Law, at the responsible approval agency, the Bavarian State Ministry for Provincial Development and Environmental Questions.

On 30 January 1980, a Letter of Intent was given to Kraftwerk Union AG (KWU) for the system with a pressurized water reactor (1350 MW gross, 1270 MW net).

On 12 February 1982, the Federal Minister of the Interior, as required by the Atomic Law, gave hi. approval to the Bavarian Provincial Agency for the issuance of the first TEG for the KKI-2.

The beginning of construction is expected in 1982, and start-up for 1988.

Owner: Bayernwerk (50 percent), Isar-Amperwerke (25 percent), Stadtwerke München (25 percent), EV Ostbayern (10 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1350 MWe gross, 1270 MWe net, 3765 MWth; pressurized water reactor.
Location: Ohu/Isar (Landshut district).
Granting of the Contract: Letter of Intent 30 January 1980.
Approval: Preliminary site decision requested March 1976, first TEG requested 13 February 1979; beginning of construction: presumably 1982.
Start-up: 1988.

Neckar-2 GKN-2 1000 MW DWR

The Gemeinschaftskernkraftwerk Neckar GmbH (GKN) issued to Kraftwerk Union AG (KWU), on 19 March 1975, a contract for a second block of the Neckar Nuclear Power Plant near Neckarwestheim-Gemmrigheim/Neckar. Just like the first block GKN-1, this should have a gross power of 855 MWe and should comprise a pressurized water reactor. The Atomic Law erection approval was applied for on 23 June 1975.

Because of the long delays in the approval procedures, it was in the meantime decided to erect a plant with a higher power. In 1980, the planning work for a 1300 MWe nuclear power plant with a pressurized water reactor was taken up by the KWU.

On 27 November 1980, the corporate members of the GKN (Neckarwerke, Technische Werke der Stadt Stuttgart, Deutsche Bundesbahn and Zementwerk Lauffen - Elektrizitätswerk Heilbronn) requested a first TEG modified to a 1300/1200 MWe block. The approval documents were made public in July and August 1981. About 28,000 objections were received. The hearing date on these objections took place on 19 days between 1 December 1981 and 11 January 1982 in Neckarwestheim and Gemmrigheim. Four objections (Heilbronn and Ludwigsburg counties, and the cities of Beilstein and Güglingen) were withdrawn previously; the other objections were sustained. GKN expects the first TEG approximately in early summer 1982.

With a beginning of construction in 1982/1983, start-up by 1989/90 is expected.

Owner and Operator: Gemeinschaftskernkraftwerk Neckar GmbH (Neckarwerke 45 percent, TWS 32 percent, Deutsche Bundesbahn 20 percent, Zementwerk Lauffen/Elektrizitätswerk Heilbronn AG 3 percent).
Delivering Firm: KWU; reactor manufacturer: KWU.
Data: 1301 MWe gross, 1230 MWe net including traction current, 3765 MWth; pressurized water reactor.
Location: Neckarwestheim-Gemmrigheim/Neckar.
Granting of the Contract: 19 March 1975.
Approval: First TEG requested 29 June 1975, requested anew on 27 November 1980 because of plan changes; beginning of construction: expected 1982/83.
Start-up: 1989/90.

Neupotz A 1300 MW DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) and the Pfalzwerke AG, on 30 April 1977, issued a letter of intent for the turnkey-ready erection of a 1300 MWe nuclear power plant in Neupotz with a BBR pressurized water reactor, to the conglomerate BBC, BBR and Hochtief. The contract was granted on 27 November 1978. It expired on 31 December 1980, and was converted into an engineering contract. The owner and operator will be the KRP, in which the RWE had a 74 percent participation and the Pfalzwerke a 26 percent participation.

On 16 June 1977, an application was submitted to the responsible agencies for the erection and start-up of a nuclear power plant block (as well as application for a preliminary site decision for a second nuclear power plant block), and the safety report for evaluation of the safety design of the system was submitted. Because of delays in the approval procedure, the process had to be continued with a new safety report and a renewed publication of the documents.

The owners are currently expecting to begin construction in 1984 and start-up in 1991.

Owner and Operator: KRP (RWE 74 percent, Pfalzwerke 26 percent).
Delivering Firm: Konsortium BBC, Brown Boveri Reaktor GmbH (BBR) and Hochtief AG; reactor manufacturer: BBR.
Data: 1374 MWe gross, 1283 MWe net, 3760 MWth; pressurized water reactor.
Location: Neupotz/Rhein.
Granting of the Contract: Letter of Intent 30 April 1977, Contract 27 November 1978.
Approval: First TEG requested 16 June 1977.
Start-up:

Vahnum A and B 2 · 1300 MW DWR

On 29 November 1974, the Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) requested approval to erect and operate a nuclear power plant with two blocks, each with 1301 MWe gross (1226 MWe net) at Vahnum on the Niederrhein between Bislich and Haffen-Mehr. On 23 November 1978, a preliminary site decision was requested. The application documents (safety report) were available to the public from 11 October to 10 November 1976. The hearing date was set for the beginning of February 1977, but was cancelled in January 1977 by the Provincial Government of Nordrhein-Westfalen. Under these circumstances, the dates for the beginning of construction and start-up are still open at the present. Originally, start-ups in 1984 and 1986 had been planned.

Owner and Operator: Rheinisch-Westfälisches Elektrizitätswerk AG (RWE).
Delivering Firm: KWU and Hochtief; reactor manufacturer: KWU.
Data: 2 · 1301 MWe gross, 2 · 1226 MWe net, 2 · 3765 MWth; two pressurized water reactors.
Location: Between Bislich and Haffen-Mehr at Vahnum/Niederrhein.
Approval: First TEG requested 29 November 1974; preliminary site decision requested 23 November 1978; beginning of construction is still open because of the energy-policy attitude of the Provincial Gorvernment of Nordrhein-Westfalen.

Pfaffenhofen A KRL 1300 MW DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE), Essen, and the Lechwerke AG (LEW), Augsburg, in October 1975, founded a joint corporation, the Nuclear Power Plant RWE-LEW (KRL) with headquarters in Augsburg. RWE has a 75 percent

participation in this corporation and LEW a 25 percent participation. The planned nuclear power plant should have an electrical power of 1368 MWe gross or about 1289 MWe net. The space arrangement process was requested in October 1976. At first, Rehling in the community of Rehling, on the eastern Lech Shore, about 12 km north of Augsburg, was proposed as a site.

On 29 January 1980, it was requested that the space arrangement process should also examine the site Pfaffenhofen at the Zusam (a region of Buttenwiesen), Dillingen County, which had provided in the Bavarian site safety plan as an alternative for Rehling. The space arrangement process was concluded by the District Government of Schwaben on 8 October 1981, in principle positively for the Pfaffenhofen site. The Rehling site, on the other hand, was not approved from the perspective of space arrangement and provincial planning.

The owner intends to request the first Atomic Law partial erection approval during the second half year of 1982 and is currently expecting to begin construction in 1984 and to begin operation in 1990.

Borken KWB 1300 MW DWR

The Preussische Elektrizitäts AG (Preussenelektra), on 11 September 1974, requested approval to erect a nuclear power plant with 1300 MWe at Borken, Kassel District. The plant should have a pressurized water reactor. There are no data for the start-up date.

Further Projects

Neupotz B 1300 DWR

The Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) and the Pfalzwerke AG, on 16 June 1977, made application for the erection and start-up approval for the first block of their planned nuclear power plant at Neupøtz/Rhein, and simultaneously requested a preliminary site decision for a second block for this power plant. Block B, just like Block A, should have a pressurized water reactor and should have a power of 1368 MWe gross or 128º MWe net. At this time there are no data for the start-up date.

SNR-2 1300 MW Sodium-cooled, fast

The Europäische Schnellbrüter-Kernkraftwerksgesellschaft mbH (ESK), in which the German-Belgian-Netherlands-British SBK has a 51 percent participation, and the Italian Electrical Agency ENEL has a 33 percent participation, and the French Electrical agency EdF has a 16 percent participation, pursues, in terms of the SNR-2, the introduction of fast breeder nuclear power plants of commercial size.

The SNR-2 is the German opposite number to the French fast breeder demonstration power plant Super-Phénix which is currently under construction. As regards the construction and operation of both power plants, there is an agreement between the partners SBK (DEBENE), EdF (F) and ENEL (I).

The planning work on the 1300-MW demonstration fast breeder nuclear power plant SNR-2 was partly interrupted because of the strong capacity commitment, through the expensive and delayed SNR-300 approval procedure. After the approval boundary conditions for the SNR-300 became clearer, the preplanning work on the SNR-2 in a loop construction mode could essentially be concluded.

In a further planning phase, by the end of 1983, appropriate investigations on a pool construction mode will be performed so that then the decision concerning the final design can be made on a well-founded basis.

The SNR-2 Nuclear Power Plant should have a gross power of about 1460 MW3 and a net power of about 1300 MWe. Kraftwerk Union AG (KWU) is intended as the principal contractor; as the supplier for the reactor (3420 MWth) it is intended to use its subsidiary INTERATOM.

A building decision, which must be preceded by several years of detailing and approval steps, can be expected only by the end of the eighties.

4. Shutdowns

KKN Niederaichbach

The Niederaichbach Nuclear Power Plant (KKN) has been shut down since 31 July 1974. It is in the status of "Safe Enclosure". The approval to this by the Bavarian State Ministry for Provincial Development and Environmental Questions was granted on 20 October 1981. With the granting of this approval, the Niederaichbach system became the sole responsibility of the Kernforschungszentrum Karlsruhe GmbH (Karlsruhe Nuclear Research Center Ltd.).

The condition "Safe Enclosure" means that all still existing radioactive components and materials within the reactor building in the containment are enclosed safely against liberation of radioactivity to the biosphere and against access by unauthorized persons. All other buildings have been cleared and are free of artificial radioactivity. They can be accessed without restriction or can be used otherwise. The control area in the sense of the Radiation Protection Ordinance is limited only to the containment. The condition and operation of the secured enclosure is verified both by instruments and by control passages, inspections, and periodic reviews.

Since the fall of 1979, the planning work for the total removal of the system has been in progress. The goal of the planning phase is the issuance of all approvals that are required to begin the on-site work. In April 1980, the approval, required according to Paragraph 7 of the Atomic Law, for the total elimination of the system was applied for at the Bavarian State Ministry for

Provincial Development and Environmental Questions. The planning work for total removal has progressed to such a point that completion of the approval process and of the presentation of expert opinions can be expected by the end of the year 1982.

KWL Lingen

In the spring of 1979, the Kernkraftwerk Lingen GmbH decided to request, from the responsible approval agency, the shutdown of the nuclear section of the 250 MWe nuclear power plant Lingen (KWL) with a boiling water reactor and a conventionally fired superheater. The system, which was started up in 1968, had already been shut down since 5 January 1977 for the installation of new steam converters.

The shutdown of the Lingen Nuclear Power Plant (KWL) will take place in several partial steps. First of all, the "Safe Enclosure" of all radioactive materials in the nuclear area will be effected. The area of the safe enclosure will extend to the reactor, the processing building, and the intermediate structures in between.

In the year 1981, the non-irradiated fission elements were transported to Exxon Nuclear GmbH to recover the uranium contained therein. Of the irradiated fission elements, 128 elements, in 8 transports, were transported off for reprocessing in Windscale.

The original project to restart the conventional system parts of the nuclear power plant (turbo set, superheater, feed water preheating) at an early date by preconnecting a 200 MW gas turbine with a waste heat oiler was abandoned. Since the superheater and the turbine can be charged only with low pressure steam (55 bar), the efficiency of the system is relatively low. For this reason, the severe rise of natural gas prices made use of such a system uneconomical.

The official application for shutdown of the system will presumably be submitted during the course of the year 1982.

KRB-A Gundremmingen

The corporate members of the 250 MW demonstration power plant Gundremminggen Block A, in which the Rheinisch-Westfälisches Elektrizitätswerk AG (RWE) has a 75 percent participation and the Bayernwerk AG has a 25 percent participation, decided on 8 January 1980 to shut down the system.

The nuclear power plant with its boiling water reactor was erected between 1962 and 1966 as the first one of three German demonstration nuclear power plants - before Lingen and Obrigheim. Since an accident, which occurred on 13 January 1977 in connection with a power short circuit and which was connected with consequent damages in the system, the plant has been shut down.

After the decision for shutdown, a program for the earliest possible implementation of safe enclosure was set up. The essential preconditions such as e.g. the removal of the irradiated and non-irradiated fuel elements as well as the required rebuilding measures in the system here turned out to be decisive in determining dates. Taking into account a 1-year approval process, KRB expects approval for safe enclosure by the middle of 1984.

The removal of the non-irradiated fuel elements has been completed. The irradiated fuel elements are currently being transported to Cap la Hague for reprocessing. A contract was granted to the working community Nuclear Engineer Service GmbH (NIS) and Kraftanlagen AG (KAH) for planning the rebuilding measures required for safe enclosure. Within the framework of this contract, provision is made to investigate different variants of safe enclosure, from which the most suitable solution will be selected and will subsequently be planned in detail.

FOOTNOTES

1) Compare ATW report "New Nuclear Power Plants in the Federal Republic of Germany 1981,", ATW 26, p 257 (April 1981).

   In a comparison with the previous year, especially as regards nuclear power plant output, it should be noted that the operators or the delivering firm, in the case of some installations, have in the meantime changed their data because of plan changes or for other reasons. For these reasons, there are differences with respect to a direct extrapolation from the figures of previous years. The basis always is provided by individual data in the table "New Power Plants", which are based on the most recent information to the ATW questionnaire.

2) Compare ATW fast statistic "Nuclear Power Plants 1981 - World Survey" ATW 27, p 171 (March 1982) as well as statistics for electrical power generation from nuclear power plants for December 1981, ATW 27, p A 36 (March 1982).

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CSO:5100/2146

OFFICIAL REPORTS ON MURUROA RADIATION CONTAMINATION

Paris LE MATIN in French 11 Mar 82 p 4

[Interview with Louis Darinot, Chairman of National Assembly's Defense Committee by Pascal Krop; date and place not given]

> [Text] Louis Darinot, chairman of the National Assembly's Defense Committee, has returned from Mururoa. Heading a fact-finding mission, he met the civilian and military officials in charge of the French Center for Nuclear Testing. The delegation then went to Australia, where it was received by the foreign minister. Louis Darinot, who must report on his mission to Charles Hernu this morning, sums up his trip for LE MATIN.

LE MATIN: The ecologists and the CFDT [French Democratic Confederation of Labor] had claimed that the Mururoa atoll was severely contaminated. What did you notice during your trip?

Louis Darinot: The information furnished by the CFDT was partially correct. Part of the atoll sank in July 1979. Then, following a tidal wave at the beginning of 1981, some of the waste material which had been imprudently sealed in bitumen was released. That waste material had been put there a long time ago, after the last open-air tests. They were made 10 meters above ground in order to test certain chemical reactions. At present, however, there is no longer any problem. The decontamination of the beach in the central portion was carried out with a great deal of care. We even went bathing there. It is indisputable--and I know what I'm talking about, being interested in toxicology and physics--that there isn't anything left.

Question: So, no traces of the past accident remain?

Answer: Yes, but only on some small coral islets which haven't yet been decontaminated because those areas are deserted. Moreover, decontamination is very difficult to achieve. Uranium is not easily detected. In such areas, they put up signs reading "Area Not Decontaminated: Radiation Possible."

Question: There had been talk about moving the French Center for Nuclear Testing...

Answer: Those are just unfounded rumors. For example, the word circulated that they were going to move to the Kerguelen Islands. That's ridiculous. A month and a half ago, I made a trip to the Indian Ocean, and I could verify that the Kerguelen Islands are inaccessible for much of the year.

Question: And Fangataufa Island?

Answer: Indeed, in 1974 France did make several tests on this island, located 150 km south of Mururoa. So, there were tests in the past, and there should be further tests in the weeks to come. It isn't remote, but in any case it won't replace Mururoa.

Question: What measures have been taken to protect Mururoa against other tidal waves?

Answer: In the defense budget, we voted the credits intended to protect Mururoa. So, they built a 3-meter high concrete wall facing the Pacific Ocean on one side and the lagoon on the other. Its purpose is to protect against future tidal waves. In addition, in each of the residential areas there are now 4.5-meter high platforms on which the inhabitants can climb in case of flooding.

Question: What are you going to ask of Charles Hernu?

Answer: First, I would like a mission led by Haroun Tazieff to verify the condition of the coral. As positive as I am that there is no radioactivity at Mururoa, I am the first to admit that I am not qualified to determine if there is a danger of the coral collapsing. The experts on the scene noted the same radial and longitudinal faults on other islands where there had been no nuclear tests--Rangiroa for example, which is 1,200 km from Mururoa.

Question: You also met with the Australians?

Answer: Yes, I spent 8 days in Australia, where I met with the foreign minister. I gave him my solemn word that all the precautions have now been taken. I can tell you on the other hand that I would not be so sure if they were planning to start atmospheric tests again. I will also ask Charles Hernu to permit Australian Members of Parliament to visit Mururoa. However, I would understand if the minister could not grant my request.

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CSO: 5100/2120

BRIEFS

RINGHALS-4 GENERATOR START DELAYED--Ringhals-3 was restarted on Tuesday after being down almost 6 months. The reactor may operate at 40 percent power for 2 months, according to a permit granted by the Nuclear Power Inspection Board (SKI). After that the three poorly designed steam generators will be examined. Fueling of the syster reactor, Ringhals-4, has been delayed, however. According to the State Power Board, the reason for this is that formal discussions between the manufacturer, Westinghouse, and the Swedish Plant Inspectorate are underway. According to plans by the State Power Board Ringhals-4, Sweden's 10th nuclear reactor, was to have been loaded with nuclear fuel on 1 April. It will also operate for 2 months, but only at 20 percent power. Subsequently, its faulty steam generators will also be examined. Ringhals-4 probably can start up in 1 week. The State Power Board and Westinghouse have had a first meeting on the legal responsibility for the problem. The question is: who will pay for the mess. [Text] [Stockholm DAGENS NYHETER in Swedish 7 Apr 82 p 14] 9336

RINGHALS-3 PLANT RESTARTING--The State Power Board may restart the damaged Ringhals-3 reactor, but it may operate at only 40 percent power for a maximum of 1,500 hours, i.e. for 2 months. After that, the steam generators will be reexamined. On Friday the Nuclear Power Inspection Board (SKI) granted permission to the State Power Board to start up Ringhals-3. The reactor has been down since 20 October last year. At that time it was discovered that a pipe in one of the three steam generators was leaking radioactive water. Later it was found that several hundred pipes in the generators had been damaged, but only two had leaked water to the turbines. There are a total of 14,000 pipes. The damage occurred because water rushed through the pipes too rapidly causing vibrations. The vibrations caused the pipes to rub against the supports that hold them in place. As early as December last year the State Power Board wanted to restart Ringhals-3, but SKI was not convinced that this was safe. Now the State Power Board has presented additional material showing that the risk of new damage in the pipes due to wear is small--at least during a limited time. In addition, instruments have been installed to monitor the vibrations and warn the personnel if more damage should occur. The problem at Ringhals-3 and at Ringhals-4, which is not yet fueled, is probably the result of a design error by the manufacturer, Westinghouse. [Text] [Stockholm DAGENS NYHETER in Swedish 3 Apr 82 p 11] 9336

CSO: 5100/2142

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May 25, 1982